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Denison's Cooling and Lubricating Compound.

Upon the importance of lubricating materials in their bearing upon safety in transportation, whether of human beings or of merchandise only, all are agreed. A great number of lubricators, simple and compound, have been offered to railroad men, and the strongest efforts have also been made to do away with them altogether. It has been hoped that the substitution of highly polished surfaces, or of extremely hard materials for those commonly in use, or even the discovery of some substance that should be so nearly exempt from the effects of friction as to form a practically non-heating bearing, would relieve travellers and merchants from the dangers incidental to motion at high speed. But these devices have all been unsuccessful, and our trust is still where it ought to be, in lubricating compounds.

Denison's Cooling Compound has been prepared with especial reference to the dangers of heating, and the success of its inventor appears to be decided.

Mr. O. K. Ford, superintendent of machinery and passenger-car department at Marshall (Central Railway of Iowa), writes, under date of July 12, 1872, that he used this compound on a box under one of a fast line of passenger-cars which came into Marshall smoking hot. He had the box, without cooling, repacked with the compound. The car was then run twenty-six miles in thirty-three minutes without making a stop, and at the end of the run was perfectly cool. We believe Mr. Ford proposes to use this lubricator in all his axles. Other authorities speak of it with equal favor. Its special peculiarity is that it not only prevents the heating of a bearing, but it cools down one which has already been heated, as the case cited by Mr. Ford shows.

The compound is manufactured by Posts & Kalkman, dealers in machinists' and railroad supplies, 111 Liberty Street, New York. They have adopted as Trade Mark, the accompanying device showing the appearance of a "hot-box." We should remark that some change being made in the bearings of one of our largest railroads, last winter, *every* through train for several months was delayed by a hot journal. Most of the way trains suffered also and the annoyance and damage on that one road it would be hard to tell. The employment of a lubricator like Denison's would have been a boon to passengers and train men alike.

The Snake River Mines, Colorado.

To the Editor—Sir: High up on the west side of the main mountain range, on one of the forks of Snake river, the small mining town of St. John is situated, in a narrow and abrupt cañon. The town owes its existence to the energetic operations of the Boston Silver Mining Association, who have been opening and developing their mine, the Comstock, for the last three or four years. They have also experimented in various ways for the purpose of determining their course in beneficiating the ores from their mine, and the results of these experiments and of the advice of professional men are the works now building and nearly completed.

The Comstock vein is located on the mountain side, high above the works, and the mouth of the main shaft is connected with the ore-floor of the dressing works below by an inclined double tramway, so that the full car in descending is made to pull up the empty one. The mine is now well opened by shaft, levels and winzes and has large resources, so that it is thought an easy task to take out 40 tons of ore per day. This ore is a mixture of iron pyrites, galena and zincblende in quartz and heavy spar, and carries, aside from rich pockets, from $20 to 40 ozs. of silver per ton. Although galena occurs in the lode in quite solid masses, and the "pay-streak" is from 18 inches to two feet wide, and in some places even thicker than that, the ore cannot be worked by any one process to advantage without a preparatory dressing, the object of which is the removal of the gangue and the separation of the galena and zincblende. The galena is then to be beneficiated in the smelting works, and the blende by means of a chloridizing roasting and barrels in amalgamation works.

DENNISON'S COOLING AND LUBRICATING COMPOUND.

It is thus seen, that for once in Colorado we find here a well considered system of beneficiation for ores, which have elsewhere in the same territory been indiscriminately treated by the amalgamation process only. This mixed system is undoubtedly the correct one for Colorado silver ores, and if it should fail to yield the Boston Silver Mining Association a satisfactory profit, the fault is to be looked for, not in the treatment of the ores, but in their low grade and the disadvantageous location of the works, to which I shall recur hereafter.

The dressing works of the association consist of:

For crushing, a Blake crusher, rollers and ball pulverizer, and besides this a battery of 10 stamps.

For dressing, three continuous jiggers, two shaking tables, and the necessary settling troughs for fine stuff. These works are not quite ready yet to commence work, but will be so in a few days. They were built after drawings by Mr. Kurtz who is also the designer and builder of the large Wilson and Cass dressing works at Georgetown. Mr. Kurtz is at St. John at present to put the finishing touches on the dressing works and put them in operation.

The smelting works consist of:

1. Two large, three-hearth reverberatories for roasting the smelting stuff, and running it finally, in the last or lowest hearth, into a slag. The same reverberatories, or one of them, will from time to time be used to chloridize the silver-bearing blendic ores.

2. One shaft-furnace with three tuyeres, about 9 or 10 feet high and the hearth of which is oval. Two tuyeres are in the sides and one in the back of the furnace, all of them having an inclination towards the middle of the hearth. The furnace widens out from the hearth to a short distance above the tuyeres, and contracts from there up to the charging door, so that the throat is of considerably smaller area than the hearth. There is no water-cooling employed at the tuyeres. The walls of the furnace are of one thickness, of a fair locking fire-brick, made on the spot, and are bound with wrought iron hoops running around the furnace, and flat-iron running up and down. The breast as well as the charge-door above are uncommonly small. The gases are conducted by means of a short horizontal flue to a sheet-iron chimney, which was formerly used in connection with a small Scotch hearth, in which surface ores were smelted experimentally. If, after a cursory examination of the whole works, I were called upon to criticize them, I should only have to find fault with the present shaft-furnace. Instead of narrowing towards the top, the shaft should widen from the tuyeres up in accordance with all the late experience in lead and copper smelting; the tuyeres should lie at least 8 to 12 inches above the level of the slag-spout, and instead of being inclined, so as to blow into the lead bath and oxidize the metal, they should be perfectly horizontal. Tuyeres cooled by circulating water would also in many respects be far preferable to those now used, which will not only necessitate the constant preservation of "noses," no slight trouble in itself, but cause an easier destruction of the walls in their vicinity, than would be the case with water cooling.

3. A large McKenzie blower, driven by a small steam-engine.

The amalgamating works are not far enough advanced for me to say anything about them. It is, however, intended to work with barrels and pans.

The motive power for the crushing and dressing, and for the amalgamation works, comes from a fine 40 horse power Allen engine, supplied with steam by two magnificent Harrison boilers. This is the first time that I have seen these two excellent appliances introduced in a mining camp, and I hope it will break the way for their more general introduction.

The plan of first roasting the dressed galena and then slagging it before smelting in the blast furnace is well adapted for the character of the ore to be treated. Even after dressing it will contain enough zinc to cause a serious loss of silver, if smelted in the raw state with iron or iron ore. If the ores should be roasted and smelted in the shaft-furnace without first slagging them, a large loss in dust would take place. As the plan is, nearly all the zinc will be car-

ried into the slag and little loss in dust is to be feared. But the roasting before slagging ought of course to be as nearly perfect as possible, so as to avoid altogether the formation of matte, which would only be detrimental in taking up lead and silver, so as to necessitate its re-working. To flux the quartzose matter from the lump-ore, and the small percentage remaining in the dressed stuff, a ferriferous lime-sinter from mineral springs in the vicinity is to be used. This, though an inferior flux, is the only one now available, as the iron pyrites in the ore is not sufficiently abundant to serve in a roasted state as flux. There are indeed ores in the vicinity of Peru and Silver City, which carry a large percentage of oxide of iron and over $100 in silver, but the distance to the smelting works, and especially the high cost of transportation over the steep grade of the last two miles and a half, render them now unavailable.

I am at present unable to give you figures in regard to the smelting, as the works have but just started; but I have the promise of having them furnished to me in a few months.

I spoke above of the disadvantageous location of the works. They are located nearly at the timberline and at the head of a very steep ascent of over a mile in length, above the junction of the South and North branches of the Snake river. There are many mines, or rather veins, in the different valleys, easily accessible from Montezuma, (somewhat over a mile below St. John.) which carry ores far richer in silver than the ores of the Comstock. But these ores are now, to a great extent, shut out from the smelting works on account of the high cost of up-hill freight, and if other works should be located at Montezuma, the present works could not at all compete with them in buying rich ores. Another serious point will, in a very short time, be the fuel question. For the present, charcoal can be got in the immediate vicinity of and above the works, but this supply will not last long. Afterwards it will have to be hauled from below at increased cost. In the construction of the works themselves the additional cost of freight between Montezuma and St. John has been a very large item.

Col. CANDLER, the Superintendent, who, together with Mr. VEZIN and Mr. KURTZ, has shown great ability in planning the works, is, I am happy to say, not at all to blame for their unfavorable position, which was forced upon him by causes not necessary to be here detailed,

The St. Lawrence Company are building works half a mile above Montezuma, on another small branch of the Snake river. Their ores consist mainly of blende carrying about 40 or 50 ozs. of silver per ton, which is mixed with a little galena and iron pyrites. Their works will do amalgamation only, and consist at present of an Airey furnace, not quite finished. They intend to put up 20 stamps and Varney pans. It is yet too early to say any thing either about the company or their works. Their mine, it appears, is at present not expected to furnish a supply for the capacity of the Airey furnace, and they intend therefore to supply the deficiency by buying ores from neighboring mines, which they hope will be worked as soon as there is a market for the ore.

A. EILERS.

Inventors in the United States should not fail to bear in mind that the Canadian Parliament has recently passed a law granting to American citizens the privilege of obtaining patents on very favorable terms. The law which went into effect on the 1st of September, provides that all inventors may receive patents, provided a foreign patent for the inventor has not been in existence more than a year prior to the application, that the applicant shall select some place in the Dominion for his domicile—this being a mere formality—and that the patent may be issued for five, ten or fifteen years at the option of the applicant. No extension beyond fifteen years is allowed, and every patent is subject to the condition that the patentee shall manufacture the invention in Canada within a period of one year from the date of granting the patent. The government fees are as follows: For five years, twenty dollars; ten years, forty dollars; fifteen years, sixty dollars. The applicant must furnish a model, specification and duplicate drawings, substantially the same as in applying for a United States patent. These conditions are of a very liberal character, and inventors on this side will doubtless take proper and profitable advantage of them.

Smith's Furnace for Shrinking on Tires.

Even in its lesser forms the process of putting a tire to a wheel is an operation wasteful of fuel and labor, and when it is applied to the tires of locomotive driving wheels, this waste is greatly increased. About three years ago, Mr. W. BELL SMITH, of Charleston, S. C., invented a light, portable furnace for use in this work which is so efficient that a tire of any size and two and one-half inches in thickness may be put on at a cost of only one bushel of charcoal and within a half-hour from lighting the fire. To those who are familiar with the usual course of this operation we need go no further than these figures, which sufficiently commend this simple and valuable furnace.

The furnace is of course annular. It consists of a box, A, made in halves, of No. 10 sheet-iron, open at the top, and held together by hinge joints so as to be easily separated. Brackets, D D, are secured to the sides of the box, to rest on the top of the tire, B, and suspend it to the same. Holes are punched around the sides and bottom of the box for the admission of air to the fuel (charcoal), which occupies the space of four inches around the tire. The tire is suspended to a crane, the furnace then placed around it, and the charcoal put in and ignited. When the tire is sufficiently expanded (which may be readily determined by measuring with a rod), it is placed on the wheel center, C, resting on the gauges, E, E; the furnace is then removed and the tire cooled off, the unburned charcoal being saved for the next operation. The furnace remains around the tire until the work is finished, so that the danger of sticking before the tire is properly placed is entirely removed. It is equally serviceable in removing tires, and it will heat the circumference of a wheel in twenty minutes so that the tire can be taken off, while the center remains so cool that the paint is not injured. Four hands can do this work easily, and be entirely free from the intense heat to which they are subjected by the old method.

In the three years that have elapsed since this excellent furnace was invented, it has made steady progress among railway machinists, and it is undoubtedly destined to enjoy extensive use.

The Kaballah.

There is a class of persons who appear to think that the ancients were far more learned than we, their successors, and occasionally a publication appears which professes to reveal the most astounding facts in relation to the intimate knowledge of the sciences possessed by the Egyptians, Chaldeans or some other past race of men. An English gentleman, a man of high scientific attainments, undertook, a year or two ago, a study of the Great Pyramid. The results of his work would be amazing, could they be believed. From that one construction he deduced the basis of the present British weights and measures, exact relations of the pyramid to the quadrant of the earth, and a number of other similar facts. The gallery leading into the massive pile pointed in one direction to the meridian of the place, and in the other to the pole star of that day. If the Egyptians had half the knowledge that this explorer showed in developing the supposed proofs of wisdom, they must have been wise indeed. But with all the confidence of Mr. SMYTH in his deductions, and with all the really wonderful coincidences he developed, the world of sober-thinking men still look upon all that he discovered as no more than coincidences. There is much to wonder at in the pyramids, but they have not yet proved the almost perfect knowledge ascribed to the Egyptians.

Mr. GEORGE HENRY FELT, formerly a lieutenant in the U. S. Signal Corps, and inventor of a system of rocket signals, and apparatus for firing rockets, and also, we believe, lately an instructor at West Point, is about to add another to the list of marvellous discoveries of ancient lore. After many years' work he thinks he has discovered the Kaballah of the Egyptians. This Kaballah is, or rather was, the soul of all things true in nature, religion and art, graphically demonstrated in a geometrical figure. We believe Mr. FELT has reconstructed this figure, which has been lost for many ages, by innumerable measurements of works of art and nature. By this course he claims to have established that the proportions of the human figure and of ancient art are in a geometrical and not an arithmetical relation. He puts forward his figure as the "canon of Greek art," and the key to proportion in all works of nature. His circular says that it also elucidates "the origin of language not only printed and written and hierogryphical or figurative, but even spoken language, thus showing the hidden and true meaning of the Old Testament," and we believe he also goes into such questions as demonstrating the existence of CHRIST, by proving the truth of his miracles, through the application of the Kaballah.

Mr. FELT has certainly undertaken a pretty serious task, and if his circular is a specimen of the style in which his work is written, we do not anticipate any very decided acceptance of his claims among careful reasoners. There are two classes for whom an author of such a work labors: those who will read his book for the sake of the strange and mysterious subject he treats of, and those who, seeking truth for the purpose of using it for the further advancement of knowledge, criticise his deductions and refuse to accept what is not really established. Books of this kind usually claim pretty nearly everything, and end in advancing nothing new that is good and nothing good that is new. We trust that Mr. FELT's performance will equal the claims of his circular, but we do not think our readers will lay upon us the accusation of illiberality so often made against scientific men, when we say that we doubt it. It is quite possible that the laws of proportion and structure can be expressed graphically. Indeed that is a reasonable claim. Even the ancient forms of letters may have a certain relation to each other and to spoken sounds. It is not impossible that a key may be found that shall make the mysteries of secret societies an open book. But even for so universal an open *sesame* too much can be claimed, and in spite of the enthusiastic artists who endorse Mr. FELT, we think he has claimed too much.

NOTES ON A METALLURGICAL JOURNEY IN EUROPE.

By JOHN A. CHURCH, E. M.

The Mercury Works at Valalta.

CONTINUED FROM PAGE 164.

The Charge consists of the ore as it comes from the mine, and of bricks made up of fine ore. Much trouble was experienced at first, in making these bricks hard. It was found that to produce a good brick, which would not fall to pieces in the furnace, the ore must not be coarser than one centimeter (0·4 inch) and must be cemented with some substance, like water containing sulphurous acid, or iron sulphate, which by attacking slightly the surfaces of the clay and gypsum in the ore, would act as a cement. The liquor in use is that which serves to condense the last condensable matters in the fumes, and is said to contain 2 per cent. of sulphurous acid. The bricks are made in moulds 10 centimeters (4 inches) high, and with a mean diameter of 15 centimeters (6 inches). They are dried on iron plates. About one-third of the ore is charged in this form; but the charge is sometimes one-half coarse ore and one-half bricks.

The Loss in working is, according to the assays continually made at the works, 22·4 per cent.; or 0·10 per cent. of the ore upon a content of 0·446 per cent. of mercury.

The Products of the distillation are:—1. Mercury. This is very pure and brings the highest price. It is all consumed in Italy and Austria. 2. Mercurial soot. This is composed of mercury in the state of powder, mixed with a little ore powder, mercury sulphide, charcoal powder, etc. It is brought to nature by rubbing it on an inclined table, when the grains of mercury powder coalesce by friction and collect in drops at the bottom of the incline. The remainder is made into bricks and re-distilled. 3. Mercury white which forms but a very small proportion of the product.

The spent ore, as it is discharged from the furnace, is not very hot, gives out no vapors of mercury and only a slight odor of sulphur.

The Labor employed consists of 2 men to each furnace; length of shift 8 hours; or 6 men to 24 hours. They bring the charcoal, make the small ore into bricks, charge and discharge the furnace, collect the soot, work it over to extract its mercury, and pack the mercury in sacks of kid skin which are afterwards placed in small kegs. Thus the 6 men complete the *personnel* of one furnace. They are paid at Valalta an average of 1·20 francs (24 cents) a day. Two furnaces require a double number of men.

The Fuel is pine wood and fir charcoal costing 7 francs a cubic meter; or 5 cents, coin, a bushel, very nearly; 600 cubic meters or 18,875 bushels are used for two furnaces yearly.

The Expense of Treatment was given by Signor TOMÉ as follows:

COST OF TREATING 10,000 K. ORE PRODUCING 34·6 K. MERCURY.

	Francs.	Proportions.
Distillation (labor)	15·02	25
Working soot	0·05	0·1
Royalty paid on production	2·30	4·0
Materials	24·78	42
Repairs: labor and materials	1·35	2·4
Running expenses	43·50	73 5
General repairs	3·72	6.3
Administration	11·90	20.2
Cost of distillation	59·12	100·0
Cost of mining	134·73	
Total cost of 34·6 k. mercury	193·85	
Cost of 1000 k. ore, francs	19·39	
Cost of 2000 pounds	$3·53	

The cost is therefor $3·53 for one ton of ore producing 6·92 pounds of mercury, or 51 cents a pound.

The expense for labor and materials upon one ton of ore (1000 k.) is as follows; both labor and materials being included under the head of "repairs."

	Labor.	Charcoal.	Running Repairs.	General Repairs.
For 1000 k	1·64 d.	84 lbs.	2·7 cents.	7·5 cents.
Proportionate parts. Total cost = 100	33·5	55·20	3·00	8·30

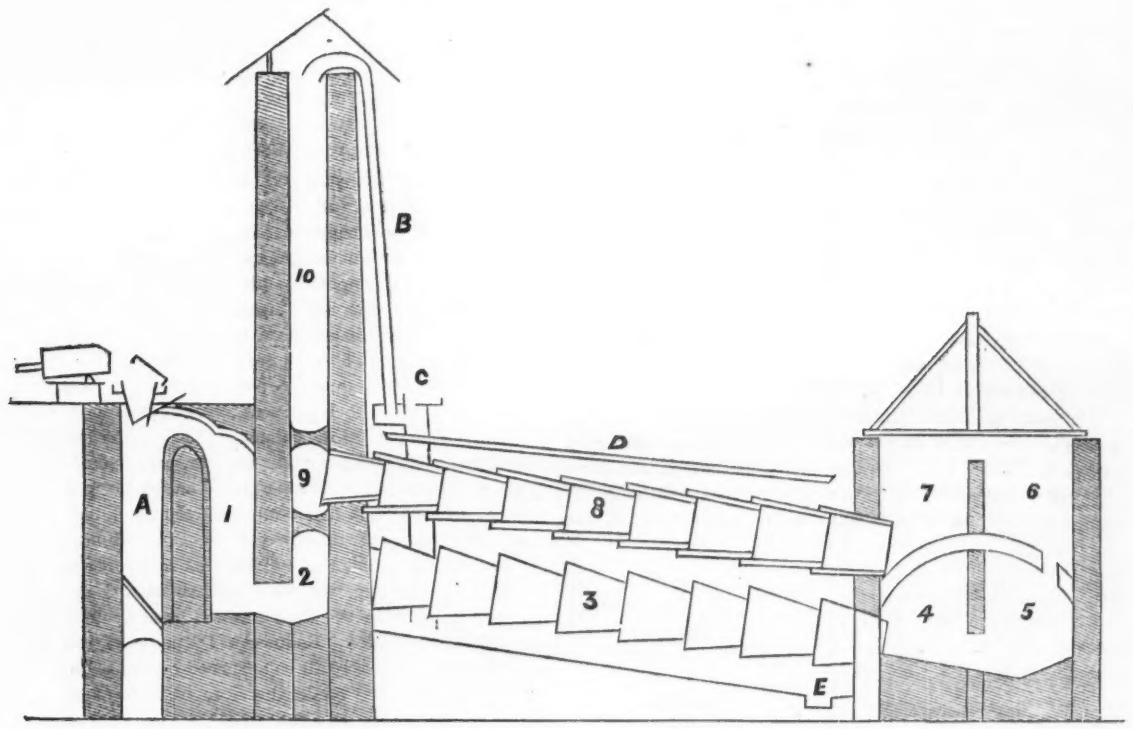

Figure 3,—FURNACE FOR THE DISTILLATION OF MERCURY AT VALALTA.

A is the furnace proper.
B the outer wood tube through which the gases pass to the trompe C.
C the water trompe.
D the water trough for wetting the tubes.
E the discharge trough for the water at the foot of the wooden incline.
1 and 2 are the 1st and 2nd condensation chambers.
3 is one of the lower tubes.
4, 5, 6 and 7 are condensation chambers numbers 3, 4, 5 and 6.
8 is the upper tube shown in section.
9 the 7th condensation chamber.
10 the chimney.

Mining cost per ton (2000 lbs.)	$2·45	or 69
Distilling	1·08	or 31
	$3·53	100

Though comparisons are never more to be distrusted than when made upon ores of mercury, mined in distant districts and worked in furnaces more or less dissimilar, it is nevertheless instructive to set the results of the Valalta furnace against those in other works. The distinctive characteristics of the HAHNER furnace is, that it is a shaft and that it works continuously instead of intermittently. Other furnaces are either of the reverberatory form or, if they are built like a shaft, they are intermittent, being filled, fired and cooled down at each operation. Between the HAHNER furnace at Valalta and those at Idria in Austria and Ripa in Italy, there are two important differences—that of drawing air regularly through the furnace, which is not done at either of the last mentioned places; and the condensation, which is by large chambers and not by tubes, as at Valalta. The work in these furnaces shows some notable differences.

At Idria[3] the ore is charged with 3 to 4 per cent. of charcoal every 1¼ hours.

The ore contains	3·11	per cent. mercury
The yield is	1·90	" "
Loss therefore	1·21	or 38·9 per cent.

At Ripa[4]

3. Berg. & Hütt. Zeitung, 1854, p. 419.
4. Bull. d. l. Soc. Ind. Min. II., 383.

The charge in 24 hours is 8,800 pounds.
Charcoal 352 or 4 per cent.
The ore contains 1 per cent.
The yield is only 25—30 per cent.

The system of condensation by chambers is not so thorough as that by tubes, and at Idria and Ripa the condensation is further hindered by the excessive amount of charcoal used, amounting to 50 and 100 per cent. more than at Valalta. This must add very greatly to the temperature of the gases. Whether the regular and moderate flow of air produced by the trompe would effect a reduction of the amount of fuel cannot be told without experiment. The ores are practically the same, except in regard to richness. It should be remarked that poorer ores at Idria require more charcoal.

The Lead Works at Mechernich

On the left bank of the Rhine there is a sandstone layer which cover a surface several square miles in area and for a thickness of more than 100 feet, contains lead in the form of sulphide and carbonate. The rock contains but little lead ore, from 2 to 3 per cent. only, but it is so friable as to break up to sand by the mere shock of the blast, and a simple but careful concentration permits the treatment of ore so poor, even, as this. Altnough this ore does not resemble that which is so common in Utah and Nevada, either in mode of occurrence or in appearance, it has about the same composition. The product consists of about 42 per cent. galena, 28 per cent. lead carbonate, and 30 per cent. quartz and clay. But these proportions are not exact. The amount of silver varies from 0·007 to 0·014 per cent. or 2 to 4 ounces to the ton of washed ore.

The general mode of treatment is by roasting and subsequent fusion with puddle slag and sometimes with metallic iron. There are two works, those of the Mechernich Company and those of Messrs. PIRATH & JUNG. Three kinds of ore are obtained. Smelting ore, "glasur" ore used for glazing earthenware, and white-lead ore, part of which is worked up to paint by RHODIUS BROTHERS, near Linz, on the Rhine, by means of the gas which issues from natural gas wells.

THE MECHERNICH COMPANY.[1]

RAMMELSBERG gives the following proportions as the average product of these sorts, at this establishment :[2]

Smelting ore	20,900	tons	containing	58	per cent. lead.
Glazing ore	1,925	"	"	62—80	" "
White lead ore	660	"	"	50—52	" "

ROASTING.

The ore is roasted in furnaces which have a hearth 33 feet long and 12 feet 6 inches wide. The roof is made of hollow bricks to lessen the weight and the enormous thrust of an arch so very flat, a weight which soon causes the falling in of an ordinary roof. These bricks are 13½ inches square, 9 inches high, and have a deep depression in their upper surface so that probably two-fifths of the material is removed. The doors are formed of a cast-iron frame set in the brick work, the

Figure 4.

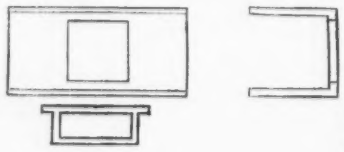

Figure 5.

frame being 2 feet long, 1 foot high and with an opening 8 inches square. This opening is closed by a cast-iron plate.

Figure 4 shows the form of the bricks and figure 5 that of the iron castings for the doors.

A cast-iron box on the top of the furnace receives the ore while it is drying. About ninety centners or 9,900 pounds are charged every 12 hours, so that the furnace roasts 9 to 10 tons daily. The rapidity of the roasting depends somewhat upon the proportion of carbonate in the charge. When there is much of this, the roasting is rapid ; and the large amount passed through these furnaces is also due to this ore. At Freiberg, where the ore is altogether sulphide, the furnaces cannot work so much. The Mechernich works have 10 of these furnaces.

The management of these furnaces is peculiar. The ore lies in a much thicker layer than is usually allowed, and toward the fire-place it is heaped up nearly to the roof, in the center sloping away to the sides, where the gases mostly pass. Next the fire-place there is a depression in the hearth, called the crucible, designed to receive the ore which is completely melted toward the end of the operation. The ore forms a broad bank at the edge of this crucible, and in immediate contact with the flames. It smelts rapidly, and as fast as the melted ore runs down into the crucible the ore behind it is pushed forward.

But it is evident that this method of treatment is not favorable to the liberation of the sulphur, a process which demands the most complete access of air, and access is prevented in these furnaces by the extreme thickness of the ore layer. Accordingly we find that although the ore cannot contain more than 5 per cent. sulphur, as a great part of it is already oxidized and there is no pyrites present, the roasting is still far from perfect. When the ore arrives at the crucible it does so with its galena probably not more than half roasted and the melting down of the fine and intimately mixed quartz and lead oxides is then so rapid that the galena is covered with a glaze of slagged ore. It is carried down with the latter into the crucible and forms a layer under it. I should judge the furnaces were producing, at the time of my visit, fully 20 per cent. of this unaltered galena.

This artificial galena is very much richer in silver than the ore which has been converted into silicate ; a circumstance which is due to the stronger chemism between silver and sulphur than between silver and oxygen. An assay was made at my suggestion of the oxidized ore and the unaltered galena from a furnace, which unfortunately for the trial. was running on very poor ore, containing about 25 per cent. lead.

I. The unaltered galena contained 0·055 per cent. silver or 7·3 ounces per ton.
II. The lead silicate " 0·008 " " " 2·3 " "

To prevent the formation of this product a new furnace has been built. It has two hearths, an under and an upper, with 75 feet length of hearth. This is a success in so far as its roasting is better, its product being an almost completely homogeneous silicate, with but few particles of galena distributed through it. In repeating this experiment a furnace has been built with a total length of hearth amounting to nearly 82 feet. The result has not been made public. There is, however, one difficulty connected with the reduction of the sulphur to so small an amount. Under the old circumstances a certain quantity of matte, about 2 per cent of the charge, was formed and collected at the bottom of the conical pots used to receive the slag. But a less quantity than this would probably elude collection and have to be thrown on the waste heap with the slag. A certain amount of matte is always retained by the slag, either in solution or in minute drops mechanically held. If the sulphur can be reduced to the amount which the slag has always retained in this manner, there would certainly be a gain ; but if the liberation of the sulphur is not carried so far, but still far enough to make the collection of the matte impracticable, there would be a loss.

In roasting by the former method it was impossible to ascertain the progress of the operation, for the mass of ore in the furnace was by no means homogeneous. The amount of galena which passed unchanged through the operation proved that it was very incomplete. In the new furnace, however, the amount of sulphur liberated can be ascertained ; and with ore containing 6·5 to 7·5 per cent. sulphur. corresponding to 48·5 and 56 per cent. galena, the roasted ore has 1·5 to 1 per cent., corresponding to 11·2 and 7·5 per cent. galena. The larger of these quantities, 1·5 per cent. sulphur, corresponds to about an amount of matte equal to about 6 per cent. of the ore ; but this would be very much lessened by the sulphur dissolved in the slag. Assuming that only one-half the sulphur was formerly eliminated in roasting, we find that about 3·5 per cent. of sulphur in the shaft furnace gave about 2 per cent. of the matte. Reduced to 1·5 per cent. the sulphur would probably all be absorbed by the slags. and the new method would therefore be advantageous. It is hoped, however, that the ore can be entirely freed from sulphur, or the latter reduced to less than one per cent. at most, and in that case there would be a considerable saving by the better roasting.

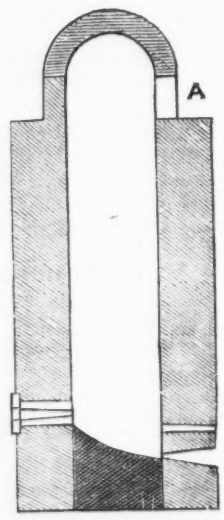

Figure 6. Lead Furnace at Mechernich.

FUSION.

The Furnaces in which the roasted ore is smelted, are shown in figure 6. They are built of ordinary red brick. They are 15 feet high, and 4 feet square, and have 4 water tuyeres, which are of the built up kind, the back piece being bolted, instead of cast, on. These tuyeres have been discarded in most works. The furnaces are closed at the top by a brick flue, the gases being led to high chimnies which complete the system. Other dimensions are as follows :

Height of furnace	15 feet.
Section, square	4 × 4 "
Height of slag hole above tap hole	14 inches
" " side tuyeres above slag hole	10 "
" " back tuyeres above side tuyeres	6 "
" " " " tap hole	30 "
Length of tuyer	30 "
Diameter of tuyer outside	14 "
" " interior	1¾ "
Material of furnace	Red brick.
Material of hearth, brasque made of	Coal ashes. Clay. Coke dust.

A round furnace had just been finished at the time of my visit, designed according to the principles which gave such success to the Freiberg furnaces. Its dimensions were as follows :

Height	15 feet.
Diameter at top	6 "
" of hearth	4 "

Air is supplied at a pressure of 9 inches of water by two fans made after especial designs. They have the usual tapering vanes and do extremely good service. Their dimensions are .

Diameter	5 feet 6 inches.
Width of blades at center of fan	10 "
" " " circumference	6 "
Diameter of conducting pipe	10 "
Revolutions per minute, maximum	1200 "
" " " when regularly working	800 "

[TO BE CONTINUED.]

1. For information contained in these notes on Mechernich, I am indebted to Herr EISENHUT, chemist to the company.

2. A full suite of the ores and furnace products of the Mechernich Company are in the cabinets of the New York School of Mines.

THE COAL TRADE.

NEW YORK, Sept. 13th, 1872.

Anthracite Coal.

The better prospects of the trade of which we spoke last week, continue to strengthen. An increased demand, natural to the season of the year, keeps down stocks and the call for coal is fully equal to the current supply. Trade is good in nearly all coals. Prices are firmer and if the production is not increased too early they will go up from the operation of natural causes. That they are to rise, and quickly, we believe is the feeling of nearly all dealers.

Under these circumstances certain rumors of a combination for the purpose of putting them up at once are received with some hopefulness. Consultations were held in the early part of the week, Mr. FRANKLIN B. GOWEN having come to New York to represent the Schuylkill region, and though, oddly enough, no one knows of what has been done, some of the parties most interested seem to have a sudden faith that something will be done next week. The plan was to raise the wholesale price of coal 50 cents a ton, an amount which is not much more than is necessary for the producers to pay expenses. But the diffidence with which a movement for even so fair an advance as this is regarded, may be seen in the fact that some thought 50 cents too much for one stroke. The market, they thought, would bear an addition of 25 cents, but they were doubtful about the effect of adding twice that sum to present prices. The fact, is an increase which will at all stimulate production will do harm by interfering with the natural improvement of prices which is now undoubtedly taking place. But nevertheless the prospect now is that coal will be 50 cents higher within a week.

In this combination all the great companies will be represented. Some individual movements had been made which will probably be forestalled by this general agreement. The Pennsylvania Company issued a circular increasing their prices 20 cents a ton to others than contractors, an advance that would probably have been extended to all takers by the next rate day. But this circular has been withdrawn and the company will act with the others. Similar advances in other quarters which are reported, will, like this, be swept away in the common rise.

It is certainly quite time that something were done for the relief of the trade. Prices that are disasterous to producers cannot continue any length of time with benefit. We have heard of financial embarrassments that have been borne with patience because the circumstances were felt to be abnormal, but that cannot last forever, and we trust that the coal dealers will soon see themselves on a sounder footing.

Schuylkill rates are now 60 cents higher in Philadelphia than before the rise of prices; 35 cents for freight and 25 cents for coal. Transportation will probably soon go up generally with the increase in the freights carried.

Anthracite Coal Trade for 1871 and 1872.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending Sept., 7, 1872, compared with the week ending Sept. 9, 1871.

COMPANIES.	1871. WEEK.	1871. TOTAL.	1872. WEEK.	1872. TOTAL.
*Phila & Reading R.R†	149,799	3,584,777	126,318	3,879,357
Schuylkill Canal	24,824	637,357	16,399	562,157
*Lehigh Valley R. R.	74,322	1,396,895	55,228	2,318,472
Lehigh & Sus. R. R.	32 874	790,111	30,579	1,191,814
Lehigh Canal	33,781	379,985	21,477	505,897
Scranton North	21,535	293,325	18,519	491,344
" South	42,293	663.137	40,298	1,472,303
Penn. Coal Co., rail	26,790	403,282	25,727	811,279
" " " canal	120	8 187	362	4,076
Del. & Hud. Canal Co.	29,860	581,752	40,178	947,096
" " East	12,485	198 662	11,462	41',651
" " West	4,025	64,772	9 231	286,074
" " South	9,992	187,386	8,623	258,756
Shamokin	10,242	441,538	9,284	374,647
Trevorton	....	.....	....	....
Lykens Valley Coal Co.	2,113	62,770	..	2,085
Wyoming North	....	.....	....	....
Wyoming South	....	.....	....	....
P. N. Y. C. & R. R. Co.	....	104,987	9,119	441,807
Williamstown Col'y	.....	.....	....	.....
Big Lick Col	4,078	98,640	....	10,591
Total	479,133	9,900,563	422,804	13,949,396
1870	422,804			9,900,563
Increase				
Decrease	56,329			4,048,833

* These figures are for the week and fiscal period commencing Nov. 30.

† Less coal transported for Co's use and Bituminous coal.

Northern Central Railway, Shamokin Division.

Below is the return of Coal sent over the Shamokin Division of the N. C. R. W., for the week ending September 7, 1872.

	Tons. Cwt.	Tons. Cwt.
East	.....	
West	8,284 08	
		9,284 08
Same time last year		10,241 17
Increase		
Decrease		957 09
Total amount shipped to date		374,646 14
Same time last year		441,537 19
Increase		
Decrease		66,891 05

Bituminous Coal Trade, 1871 and 1872.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Sept., 7, 1872, compared with week ending Sept. 9, 1871.

COMPANIES	1871. Week.	1871. Year.	1872. Week.	1872. Year.
C. & O. Canal	19,933	466,375	16,549	437,477
B. & O. R. R.	25,050	854,932	21,537	852,894
H. & B. T. R. R.	3,432	227,141	6,064	206,346
*Harrisburg & D.	7,812	389,025	9,187	349,463
*L. V. R. R.	6,913	276,245	645	20,997
P. & N.Y.C. & R. Co.	....	.....	7,206	263,707
Cumberl'd Branch Canal	5,892	136,605	5,632	148,843
" Railroad	876	48,765	651	12,718
Total	69,898	2,400,088	67,471	2,292,208
	67,471	2,292,208		
Decrease	2,427	107,880		
Increase				

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, Sept. 7, 1872.

BY RAILROAD.—ANTHRACITE.

PASSING OVER MAIN LINE AND LEB. VAL. BRANCH.

	Tons. Cwt.
From St. Clair	38,655 14
" Port Carbon	6,290 09
" Pottsville	3,050 18
" Schuylkill Haven	19,686 16
" Pine Grove	3,087 03
" Tamaqua	16,740 15
" Harrisburg	
" Dauphin	6,151 13
Total	93,663 08

FOR SHIPMENT BY CANAL.

Passing Frackville Scales	6,877 18
" Mill Creek "	2,112 04
" Schuylkill Valley Scales	47 01
" Mt. Carbon "	1,373 15
" Cressona "	7,682 08
" Pine Grove "	
" Tamaqua "	1,054 08
Total	19,147 14

SHIPPED WESTWARD VIA NORTHERN CENTRAL RAILROAD.

Passing Locust Gap	11,646 03
" Shamokin	4,607 07
" Herndon	.....
Total	6,253 10

SHIPPED WEST OR SOUTH FROM PINE GROVE.

Via Schuylkill & Susquehanna R. R.	1,159 03
" Lebanon & Pine Grove Branch	391 06
Total	1,550 09

CONSUMED ON LATERALS.

From Frackville Scales	724 16
" Mill Creek "	461 03
" Schuylkill Valley Scales	982 14
" Mt. Carbon "	875 02
" Cressona "	458 19
" Pine Grove "	43 18
" Tamaqua "	548 04
Total	4,094 16

LEHIGH AND WYOMING COAL.

Received via Allentown, E. Penn'a Br.	77 02
" " Alburtis, " "	25 01
" " Oreland, G. & N. Br.	1,053 01
" " Connecting R. R.	.....
" " Willow Street R. R.	453 02
Total	1,608 06

BITUMINOUS.

From Harrisburg	9,166 15
" Connecting R. R., G. & N. Br.	
" Junction R. R.	20 00
Total	9,186 15

COAL FOR COMPANY'S USE.

Anthracite	6,231 09
Bituminous	214 10
Total	6,445 19

RECAPITULATION.

	Total for Week.	Corres-p'g week last year.	Increase and Decrease.
Passing over Main Line and Leh. Val. Branch	93,663 08	108,448 07	d 14,784 19
For Shipment by Canal	19,147 14	30,481 03	d 11,333 09
Shipped Westward via Northern Central R. R.	6,253 10	4,329 01	i 1,924 09
Shipped West or South from Pine Grove	1,550 09	2,142 26	d 591 17
Consumed on Laterals	4,094 16	2,934 12	i 1,160 04
Lehigh and Wyoming Coal	1,608 06	1,463 15	i 144 11
Total Anthracite paying freig't	126,318 03	149,799 04	d 23,481 01
Bituminous	9,186 15	7,812 08	i 1,374 07
Total of all kinds paying freig't	135,504 18	157,611 12	d 22,106 14
Coal for Company's use	6,445 19	4,142 07	i 2,303 12
Total Tonnage for Week	141,950 17	161,753 19	d 19,803 02
Previously this year	4296928 18	3978448 09	i 318,480 09
Total to date	4438879 15	4140202 08	i 298,677 07

SHIPPED BY CANAL.

From Schuylkill Haven	15,847 15	27,306 12	d 11,458 17
" Port Clinton	551 00	2,224 00	d 1,573 00
Total Tonnage per Week	16,398 15	29 430 12	d 13,031 17
Previously this year	545,758 00	1617,899 05	d 72,141 05
Total to date	562,156 15	647,329 17	d 85,173 02

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending September 7, 1872.

	1872. WEEK.	1872. YEAR.	1871. WEEK.	1871. YEAR.
By Railway	25,727 08	811,279 08	26,789 13	403,282 18
" Canal	361 15	4,075 12	120 03	8,187 08
Total	26,089 03	815,355 00	26,909 16	411,470 06
Increase 1872	403,884 14			

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Saturday, September 7, 1872.

	Tons. Cwt.
From Schuylkill Haven	15,847 15
" Port Clinton	551 00
Total for week	16,398 15
Previously this year	545,758 00
	562,156 15
Total	
To same time last year	637,367 19

Lehigh Coal and Navigation Company.

Report of Coal transported over the Lehigh Canal and L. & S. Div of Central Railroad of New Jersey for the week ending Sept. 7, 1872, and for the year 1872.

	WEEK.	YEAR.
Forwarded East of M'ch Chunk by Rail	30,578 16	1,191,814 05
Delivered at and above do., ...	2 968 19	39,950 03
Forwarded East of do., by Canal	21,476 14	505,897 00
	53,024 09	1,737,661 08
Corresponding period last year—		
Forwarded East of M. Chunk by Rail..	32,873 12	790,111 05
Delivered at and above do., ..	1,510 16	40,099 03
Forwarded East of do., by Canal	33,781 03	379,984 18
	68,165 11	1,210,195 06
Increase on Railroad	.....	401,554 00
Decrease " "	2,836 13	
Increase on Canal	.....	125,912 02
Decrease " "	12,304 09	
Of the above there was transported on account of—		
Lehigh Coal Nav. Co	21,364 11	607,415 13
Wilkesbarre Coal & Iron Co.	15,073 02	686,347 15
	36,437 13	1,293,763 08
Corresponding period last year—		
Lehigh Coal & Nav. Co	19,217 09	333,811 19
Wilkesbarre Coal & Iron Co.	18,611 18	576,801 06
	37,829 07	910,613 05
Increase	.....	383,150 03
Decrease	1,391 14	

Delaware Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna & Western Railroad, for week ending Saturday, August 31, 1872.

	WEEK. Tons. Cwt.	YEAR. Tons. Cwt.
Shipped North	17,287 10	472,814 19
Shipped South	42,693 13	1,432,004 17
Total	59,981 03	1,904,819 16
For the Corresponding time last year :		
Shipped North	23,619 02	274,749 12
Shipped South	41,659 01	620,843 08
Total	55,277 03	895,633 00
Increase	.....	1,009,186 17
Decrease	5,296 00	.....

Coal transported on the Delaware, Lackawanna, & Western Railroad for the week ending Saturday, Sept. 7, 1872.

	WEEK. Tons. Cwt.	YEAR. Tons. Cwt.
Shipped North	18,518 05	491,334 04
Shipped South	40,298 03	1,472,303 00
Total	58,817 08	1,963,637 04
For the Corresponding time last Year :		
Shipped North	21,535 04	296,324 16
Shipped South	42,292 18	662,137 06
Total	63,829 02	959,462 02
Increase		1,004,175 02
Decrease	5,011 14	

Penn. and N. Y. R. R.—Coxton, Pa.

Coal tonnage for week ending September 7, 1872.

	Week. Tons. Cwt.	Total. Tons. Cwt.
Anthracite received :		
From Lehigh Valley R. R.	7,103 01	270,486 09
" Lack. & B. R. R.	1,431 10	60,137 01
" Pleasant Valley R. R.	364 03	73,179 13
" Sul. & Erie R. R.	220 10	38,024 04
Total	9,119 04	441,807 07
Distributed :		
To Lehigh Valley R. R.	4 06	30,610 06
To Lack. & B. R. R.	..	1,017 17
To S. Central R. R.	1,284 05	79,432 06
To Ithaca & A. R. R.	499 00	72,948 12
To Erie R. W. Pockets for shipm't.	5,927 15	199,404 03
To individuals on line of road	611 08	14,978 01
To points at & above Coxton for use of Co.	517 14	18,228 08
To points between Waverley and Elmira	274 16	25,187 14
Total	9,119 04	441,807 07
Bituminous received from BARCLAY R. R.		
Shipped north from Towanda	7,147 09	261,580 18
Shipped south from Towanda	58 17	1,955 08
Northern Central R R.	.....	170 10
Total	7,206 06	263,706 16
Distributed :		
To Erie Railway	6,532 03	235,798 12
To So. Central R. R.	615 06	25,595 01
To Ithaca Valley R. R.		57 05
Lehigh Valley, R. R.	6 08	1,145 02
To individuals on line of Railroad.	....	855 12
To points on line of road for use of Company	52 09	255 04
Total	7,206 03	263,706 16
Grand totals transported :		
Anthracite	9,119 04	441,807 07
Bituminous	7,206 06	263,706 16
Total	16,325 10	705,514 03

Lehigh Canal Coal Trade.

Shipped for the week ending September 6, 1872.

	Week. Tons. Cwt.	Week. Tons. Cwt.
Total from Mauch Chunk Region	6,572 17	166,273 11
" " Beaver Meadow "	5,093 00	104,123 00
" " Mahanoy "	.....	7,579 12
" " Hazleton "	5,231 19	159,398 06
" " Upper Lehigh "	897 15	19,594 07
" " Wyoming "	3,681 03	48,528 04
Total	21,476 14	505,897 00
Corresponding week last year	33,781 03	379,984 18
Increase	.....	125,912 02
Decrease	12,304 09	

Report of Coal Transported over Central R.R. of N. J. (Lehigh and Susq. Div.)

Week ending September 7—Compared with same time last year.

WHERE SHIPPED FROM	WEEK 1872., tons ct	WEEK 187-. tons ct.	YEAR 1872 tons cwt.	YEAR 1871, tons cwt.
Wyoming Region	28195 09	34026 12	1008892 16	818039 05
Upper Lehigh Region	3482 06	4023 08	136547 11	47839 14
Beaver Meadow Region				
Hazleton Region	5296 00	11942 19	166580 12	91722 12
Mahanoy Region				
Tresckow Region	2221 17	3418 19	103972 09	33949 10
Mauch Chunk Region	8954 17	5435 07	304283 10	130983 12
Totals	46150 09	58937 05	1720076 18	1122534 13
Increase	12786 16		597542 05	
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	30578 16	32873 12	1191814 05	790111 05
Forwarded East of Mch Chunk by Canal	10671 09	19676 07	324615 15	212561 17
Delivered at and above Mauch Chunk	968 19	1510 16	39950 03	40099 03
L. V. R. R at Packer'n	150 07	2s8 01	10101 04	23180 08
Delivered to L. & B. R. R.at Plymouth Bridge	3889 18	4588 09	153595 11	56582 00
Totals				
Of the above there was transported on acc'nt of L. C. & N. Co	14791 14	10160 00	441142 02	184131 01
W.-B. C. & I. Co	15073 02	18611 18	686347 15	576801 16
Totals	29864 16	28771 18	1127489 17	760932 07
Increase	1092 18		366557 10	
Decrease				

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending Sept. 7, 1872, with totals to date, compared with same time last year.

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL Tons. Cwt.
Total Wyoming	8,393 05	396.295 06
" Hazleton	43,039 15	1,167,704 07
" Upper Lehigh	119 11	2,069 14
" Beaver Meadow	17.907 15	575 416 10
" Mahanoy	4,990 02	294,553 05
" Mauch Chunk	28 07	2,294 18
Total	74,388 15	2.936,334 00
Same time last year	101,435 16	1.724,053 00
Increase		1,212,281 00
Decrease	27,047 01	
Forwarded East from Mauch Chunk by rail	55,227 17	2.318,471 17
Same time last year	74,321 14	1,396.894 14
Increase		921,577 03
Decrease	19,093 17	

DISTRIBUTED AS FOLLOWS.

Forwarded East from Mauch Chunk by rail	54,328 14	2,282.820 16
do East for use L. V. R R	899 03	35,651 01
Delivered at and above Mauch Chunk for use of L. V. R.R.	877 14	44.078 07
To P. & N. Y. R. R.	7,103 01	270,466 09
To N. C. R. R., at Mount Carmel		1,952 05
To D. H & W. R. R.	616 03	20.6:5 14
To L. & S. R R. at Packerton for rail	269 14	9,886 03
Delivered at M'h Chunk	32 14	1,325 16
Delivered on line of road above Mauch Chunk	285 06	12.082 12
To L S.&R R., at Penn Hav., for railroad		4,001 09
Do. for canal	5.231 19	159,864 13
To Lehigh Canal Mauch Chunk	4,251 18	84.018 12
To Catawissa Railroad	492 09	9,490 03
Total	74,388 15	2,935.334 00

Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the week ending Saturday Sept. 7, and during the year 1872, compared with the corresponding period of 1871.

WEEK.

	To C.& O. Canal Tons. Cwt.	To B.&O. R.R. C. Tons. Cwt	Total. Tons Cwt.
1872	16,549 07	21,5?6 18	38,086 05
1871	19,933 05	25,049 16	44,983 01
Increase			
Decrease	3 383 19	3,512 18	6,896 16

YEAR.

1372	437,477 09	852,894 03	1,290,371 12
1871	466,374 15	854.931 18	1,321,306 13
Increase			
Decrease	28,897 06	2,037 15	30,935 01

Cumberland Branch R. R.

WEEK.

	To C. & O. Canal. Tons. Cwt.	To B.&O.R.R. Co Tons. Cwt.	Total. Tons. Cwt.
1872	5 631 17	650 18	6,282 15
1871	5,891 18	876 00	6,767 18
Increase			
Decrease	260 01	225 02	485 03

YEAR.

1872	148,842 17	12,718 15	161,561 12
1871	136,605 04	49,765 08	186,370 12
Increase	12,237 13		
Decrease		37,046 13	24,809 00

Delaware and Hudson Canal Company.

The following is a statement of Coal Transpo ted by the Delaware and Hudson Canal Co. for the week ending Sept. 7, 1872.

	FOR THE WEEK.	FOR THE SEASON.
By Delaware and Hudson Canal,	40,178	947,096
Py Railroad, East	11,462	411,651
" " West	9,231	266,074
" " South	8,623	258,756
Total Tons	69,494	1,883,577
For the same period last year.		
	FOR THE WEEK.	FOR THE SEASON.
By Delaware and Hudson Canal,	29,860	581,752
By Railroad, East,	12.485	198.662
" " West	4 025	64,772
" " South	9,992	187,386
Total Tons	56,362	1,032,572
Increase	851,005	

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, September 7, 1872.

	WEEK.	SEASON.
North	50,643 04	1,763.853 02
South	8,622 17	258,755 15
Total 1872	59,266 01	2,022.608 17
Corresponding time in 1871:		
North	56.614 12	839,436 09
South	9,992 12	187,385 17
Total	66,607 04	1,026,822 06
Increase North		
Decrease North		
Increase South		
Decrease South		
Total increase 1872		995,786 11
Total decrease 1872	7,341 03	

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW YORK. September 13. R. A.	W. A.	AT PHILADELPHIA. September 13. R. A.	W. A.
SCHUYLKILL.				
Lump	$— —	$— —	— —	
Steamer	— —	— —	— —	— —
Broken	— —	— —	— —	
Egg	5 25	4 75	— —	— —
Stove	5 50	5 00	— —	— —
Chestnut	4 25	—	— —	
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	5 35	—	— —	— —
Broken	4 60	— —	— —	— —
Egg	4 60	— —	— —	— —
Stove	4 85	— —	— —	— —
Chestnut	4 35	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS				
Honey Brook, Le'h	W.A. 4 00@5 00		— —	— —
Spring Mountain	" " — —@— —		— —	— —
Sugar Creek	" " — —@— —		— —	— —
Sugar Loaf	" " — —@— —		— —	— —
Old Compy's	" " 4 00@5 15		— —	— —
Room Run	" " 4 00@4 50		— —	— —
McNeal	" " — —		— —	— —
Girardville	" " — —		— —	— —
Hill & Harris	" " — —		3 10@4 00	— —
Shamokin	" " — —		— —	— —
Lykens Valley	" " — —		— —	— —
Broad Top	" " — —		— —	— —
McMichael	" " — —		3 25@4 25	— —
Henry Clay	" " — —		— —	— —
Powelton	" " — —		— —	— —

Company Coals.

September, 1872.

	L.	Str.	Gra.	Eg.	Sto	Chest
*Scranton at E. Port	3 45	3 45	3 65	3 70	4 00	3 50
*Pittston at Newburg	3 80	3 80	3 80	3 80	4 00	3 80
*Lackawana at Weehawken	3 50	3 50	3 50	3 70	4 00	3 60
Wilk'b're at Hoboken	3 60	3 65	3 85	3 85	4 10	3 60
Old Co. Lehigh at PtJohn'n	5 25	—	4 50	4 50	4 60	4 00
Lehigh at Eliz. Port	5 00	—	4 25	4 25	4 50	4 00

For freights to different points see "Freights."
To contractors only.

Prices at Baltimore—September, 1872.

Wholesale Prices to Trade.

Wilksbarre, by cargo or car load	$4 60@4 85
Pittston and Plymouth, do	4 60
Shamokin Red or White Ash, do	4 75
Lykens Valley Red Ash, do	5 50
Zerba Valley	
Troverton	
By retail, all kinds per ton of 2,240 lbs	6 50@7 50
George's Creek and Cumberland f. o. b. at Locust Point for cargoes	4 60@4 65
Fairmont and Clarksburg gas f. o. b. at L. Point	6 00

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein, f. o. b. at Phila	$
Lemon " " "	
Cumberland Vein Coal	
Consolidation Coal Co.'s on board N. Y.	
Maryland Coal Co "	

Prices at Georgetown, D.C., and Alexandria, Va.

September, 1872.

George's Creek and Cumberland f. o. b. for shipping	$4 25@4 35

Prices at Havre de Grace, Md.

September, 1872.

Wilkesbarre and other White Ash for Cargoes	$4 25@4 50
Lykens Valley	@5 50
Shamokin Red or White Ash	4 25@4 50

Bituminous Coals (Cumberland).

Georgetown, F.o.b	$4.25
Baltimore	4.50
New York	6.60

Prices of Gas Coals.

September, 1872.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N. Y

	Coarse.	Slack.
Block House	$1 60	$— 75
Gowrie	1 60	— 75

Vessels are being chartered at $3 00 to $3 25.

Corrected by Bird, Perkins & Job, 27 South street.

	Coarse.	Culm of Coal.
Pictou	$2 25	1 25
Sydney	2 25	- 80
Lingan	1 60	- 80
Caledonia	1 60	- 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty on all slack coal or Culm: 40c. per ton of 28 bushels, 80 pounds to the bushel. On all bituminous coal or shale: 75 cents per ton of 28 bushels.

AMERICAN.

	Currency.
Westmoreland	$7 10 @— —
Fairmount Gas Coal Co. of N. Y.	7 00 @— —
Despard Coal Co	7 00 @— —
Penn	7 10 @— —
Newburg Orrel Gas	— — @— —
West Fairmount Gas Coal	7 00 @— —
AT PHILADELPHIA.	
Westmoreland	6 00 @— —

Prices of Foreign Coals.

September, 1872.
Duty 75 c. per ton.

Corrected weekly by ALFRED FARMELE, No. 32 Pine street, N. Y.

Liverpool Gas Caking	$ 8 00@— —
" Cannel	12 00@13 00
" House	19 00@20 00
" Orrel	14 00@16 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$14 00@16 00
"Cannel, "	19 00@23 00

Per ton 2.000 lbs. delivered.

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven for consumption ($1 85 less 55c drawback	$1 30
For reshipment	1 75

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Phillipsburgh	$0 66
C. R. R., N. J., Phillipsburgh to Elizabethport	0 98
Shipping expenses at Elizabethport	25
Wharfage	10
Total	$1 99

MAUCH CHUNK TO PORT JOHNSON.

L. V. R.R., or L. & S. R.R. from M. C. to Phillipsb'g	$0 66
C. R. R., of N. J., Phillipsburgh to Pt. Johnson	0 98
Shipping expenses	25
Wharfage	10
Total	$1 99

TO HOBOKEN

L. V. R. R., Mauch Chunk to Phillipsburgh	66
Morris & Essex R. R. Phillipsburgh to Hoboken	0 98
Shipping expenses	25
Wharfage	10
Total	$1 99

TO SOUTH AMBOY.

L. V. R. R.	66
B. & D. R. R. / Cam. & Am R. R.	93
Shipping Expenses	3
Total	$ 199

PENN HAVEN TO ELIZABETHPORT.

L. V. R R. Penn Haven to Phillipsburgh	0 7
C. RR. of N. J. Phillipsburgh to Elizabethport	0 98
Shipping expenses	25
Wharfage	10
Total	$2 11

Freights.—September, 1872.

TO EASTERN PORTS.	Cumberland. From Georgetown.	Anthracite. From Baltimore	From Philadel'a.	From Elizabeth Port Johnson, and Hoboken.	From Newburgh.	From Rondout.
Amesbury		2 80		1 75	2 00	
Bangor		2 75				
Bath		2 50		1 75	2 10	
Boston	2 50	2 75		1 00	1 15	
Bridgeport	2 25	2 30		1 40	1 60	
Bristol	2 40					
CohassetNar'ows	2 75			1 25	1 35	
Derby	2 75				1 65	
Dighton	2 35			1 75	2 30	
East Cambridge				1 40	1 65	
Fall River	2 25	2 50				
Hackensack				1 60		
Hartford	2 75	3 00		50		
Hoboken	1 90			50		
Jersey City	1 90			1 75		
Lynn				1 25		
Middletown				1 25	1 35	
Mystic	2 60	2 75		1 45		
New Bedford	2 50	2 75		1 90	2 30	
Newburyport	2 85	2 90		1 00	1 15	
New Haven	2 25	2 30		1 20	1 35	
New London		2 25		1 40	1 65	
Newport	2 25	1 90		50		
New York	2 05	1 90		1 00	1 15	
Norwalk	2 50	2 50		1 30	1 45	
Norwich	2 30	2 25		1 50	1 75	
Pawtucket	2 80	2 70		1 75		
Portland	2 60	2 75		1 85	2 25	
Portsmouth, N.H	2 70	2 90		1 40	1 65	
Providence	2 25	2 50				
Rockport						
Saco				1 20	1 40	
Sag Harbor	2 85	3 00		1 85	2 10	
Salem	2 25	2 80		1 00	1 15	
Stamford				1 25	1 35	
Stonington				1 80		
Taunton				1 40	1 65	
Warren						
TO RIVER PORTS						
Albany	3 00	2 30				
Catskill						
Cocksackie						
Coeyman's						
Cold Spring	2 30	2 25				
Fishkill						
Haverstraw	2					
Hudson	2 30	2 25				
New York						
Nyack	2 25					
Poughkeepsie	2 25					
Rhinebeck						
Rondout						
Saugerties						
Sing Sing						
Stuyvesant						
Tarrytown						
Troy	3 00	2 40				
West Point						
Yonkers						

Foreign and Provincial Freights.

September 1872.

Foreign.

Newcastle and Ports on Tyne, per keel of 21 1-5 tons £
Liverpool, 5 per cent primage

TO NEW YORK.

Provincial	
Sydney	$3 05
Lingan	3 50
Cow Bay	3 75
Port Caledonia	3 10
Little Glace Bay	3 00

TO BOSTON.

Sydney	3 00
Lingan	3 00
Cow Bay	3 10
Port Caledonia	3 00
Little Glace Bay	2 90

MARKET REVIEW.

NEW YORK, Sept. 11, 1872.

IRON—The market for Scotch Pig has stiffened considerably since our last, and, as foreshadowed in previous issues, prices seem to have commenced an upward turn. Holders are firm, and we do not hear of any Eglinton to be had now at anything less than $52, while some holders ask $53. The fact that the late advances are likely do be permanent. has forced itself upon the minds of buyers, who have gone into the market and purchased more freely than for some time past. So far as we can learn, there is no speculation, the business done being for actual consumption, which seems to confirm the idea that full prices will prevail in future. We quote Eglinton $52a53, Glengarnock $54a55, and Gartsherrie $56a57. The stock of Coltness is concentrated in few hands, and holders are reluctant to give quotations. We understand a holder was offered $55 for large lots of Gartsherrie, which was refused, as at present cost of the article on the other side, it cannot be laid down for less than $60. We note sales of 300 tons Coltness, part before our last, at $58; 120 do. Gartsherrie, $57; 50 do. Langloan, to close a shipment, $54; 250 do. Eglinton, part $53; 100 do. Clyde, and 100 do. Monckland, on private terms. In Domestic, the market continues very firm—the same state of things exist as for many months past, viz., a scarcity of Lehigh brands, while for small lots that may be obtainable full prices are asked; we quote No. 1 $55a57, No. 2 52a53, and Gray Forge $48a49; with sales of 200 tons Allentown, from one consumer to another, at about $56; 100 do· $57; and 300 do., at Philadelphia, from a speculator on terms not made public. Rails are quiet at $75 gold for New English—a small lot of 50 tons 50lbs. sold at $76. Old are steady at $50 for English, with sales of 500 tons D. H., to arrive at Philadelphia, 400 do., to arrive Baltimore; both $54 gold; and 600 do. American T, at Baltimore, on private terms. New American may be quoted $87,50a90 at the mills in Pennsylvania for spot and future delivery, with sales of 2000 tons at the mills at a price not transpired. Scrap is weak, and holders show a disposition to realize; we quote from yard $51a54, and from dock about $48; sales of 200 tons from yard, 150 do. from dock, and 150 do. Cast and Wrought. a mixed lot, on terms not made public. Refined Bar continues very steady and firm, with a fair demand· We note sales of 400 packs Russia Sheet, at 16½ cents for No. 1 Stained, and 17½ for Sound, gold. Common Sheets are very firm, at our quotations.

PHILADELPHIA, September 9.—(From a Circular of Edward Samuel)—In Pig there has been more inquiry for Nos. 1 and 2 than anything else. Old Rails are somewhat weaker under the pressure to sell. We quote American No. 1 Foundry Pig at Furnace, $53a54; No. 2 $50a51; No. 3 Forge $47a48; No. 4 White and Mottled, $42a44; American Refined Bar (Mill price) 5¼ cents; common $100a107,50.

LEAD—Common Plumbing Pig continues steady at $6,45 with a sale of 100 tons—American $6,30a6,35, gold. Prime soft is held for full prices. Bar 9¼ cents, Sheet and Pipe 11, and Tin-lined Pipe 16½ less 10 per cent to the trade.

COPPER—Ingot has become dull, and we only noticed 200,000 lbs. Lake at 33½ cents, prompt cash and a small lot English 32¾, cash. We quote as before 33½a33½ cents on the spot, though the latter is perhaps an outside figure, and 33¼a33¾ for October and November delivery. Manufactured is without change.

SPELTER—Continues quiet at old figures.

STEEL—The market continues firm and steady at our quotations.

TIN—Cable telegrams quote English $158 (£4 higher) and Straits $123. This market continues quiet, and we have only to report sales of 200 pigs Straits, at 33a33½ cents, gold. Plates move very slowly, and prices slightly favor buyers—the only sales we hear of are 250 bxs. assorted Charcoal Tin, at $13,25 gold; and 500 do. Coke Terne, within our range.

ZINC—The market is steady at 10¼a11 cents for Sheet as wanted from store. White French is quoted at 9½ gold, Amerscan 9¼ currency, Manganese black oxide 4½, Pyrolusite 5½.

From the monthly Circular of Messrs. WHITE & HASKEL, dated N. Y., Aug. 31st, we extract the following:

COPPER—The latter part of the month the market has been quiet, and prices has declined, and at the close are a trifle in favor of buyers. We quote spot Lake 33¼a33⅜ cents, Baltimore 33⅜, English best selected 33, Crockers 33, and Lake for future delivery 33½a33¾.

TIN—Consequent upon a very high demand, heavy stocks, and extremely unsatisfactory and variable foreign reports, our market has continued to decline throughout the month, and closes at the lowest point. We quote Straits 35½ cents, Eng. L. & F. 33, and Banca 40. Straits in England opened at £155a156, but the market became dull and the price declined to £147. Towards the end of the month it further receded to £142, but rallied again to £146 10s. our closing quotations. Eng. L. & F. in England has gradually declined from £156 to £150, our latest cable quotations. Banca in Holland has ranged from f.96 to f.94, closing dull and nominal. Tin in Singapore has ranged from $37,75 to $38,25. Cable advices of 28 inst. quotes Straits at Penang at $36. The importations for August were 11,080 slabs or 402 tons Straits, &c., and 55 tons Eng. L. & F. From the East Indies 10,012 slabs 402 tons Straits, and 1,100 slabs or 35 tons Billiton are on the way and due in all September. October and November. Stock in importers and speculators hands, 7000 slabs or 280 tons Straits, and 50 tons Eng. L. & F. Total in New Y rk and Roston August 31, 1872, 7000 slabs or 330 tons, against 1,1' 0 slabs or 34 tons, same time in 1871; 1,300 slabs or 49 tons, 1870; 10,200 slabs or 410 tons, in 1809.

TIN PLATES—We quote: Chl Tin Plates—Bradley, P. S. & Co., Melyn &c., 13¼a13½ cents; and R. G. Allaway's Eagle, Talbot, Gwendreath, &c., 13a14½. Chl. Ternes—M. F. 12¾a13; S. T. P.. 12a12¼; and R. G., Grath, Allaway's, Talbot, Parkend, & 11¼a11¾. Cokes—Cookley, A. B. &c., 12¾a13¾ cents; B. V., Olscastle, L. P., C. P., and Cynon, 12¼a12¼; and Y. and B. C., 11¾a12. Coke Ternes—Glantawe. Lantwit, &c., 10¾a11 cents.

LEAD—There is but little activity, and prices remain about the same.

SPELTER—Trade depressed and prices unremunerative. We quote Stolberg 6¾ cents, and Silesian 6¼a7, gold.

A Circular of Messrs Baring Brother & Co. dated London, Aug. 23, 1872 contains the following metal intelligence:

COPPER—English—Tough Cake and Ingot £103a£111, Tile £101a£111, Best Selected £106a£113, Sheathing £108 a£114. Foreign rather dearer—Chili Bars £94a£95, Urmeneta Ingots $106a£103.

IRON—Very fine; Weardale Steel Rails (Bessemer) £16, Plates £26, Rigs 160s. cash, W. B. Pigs 120s.a125s. dash; Tudhoe Bars £16 10s., Hoops £18, Plates £2), Iron Rails £12, all f. o. b. on Tyne; Welsh Rails and Bars £11a11 10s. f. o. b. in Wales, 6 months; Scotch Pigs 132s.a132 6d cash for mixed numbers on Clyde.

TIN—English declined 3s.; Blocks and Ingots 150s. Bars 151s., and Refined 152s. Foreign—Straits 145s.a147s. and Banca 156s.a158s.

SPELTER.—Silesian £22 5s.a£22 10s.

METALS.

NEW YORK, September 11, 1872.

IRON.—Duty: Bars, 1 to 1¼ cents ℔ lb; Railroad, 70 cents ℔100 lbs.; Boiler and Plate, 1½ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ℔ lb; Pig, $7 ℔ ton; Polished Sheet, 3 cts. ℔ lb; Galvanized 2½; Scrap Cast, $6; Scrap Wrought, $8 per ton. All less 10 per cent. No Bar Iron to pay a less duty than 35 per cent. ad val.

	Store Prices.
Pig, Scotch—Coltness ℔ ton	— —@— —
Gartsherrie	56 00@57 00
Glengarnock	54 50@55 00
Eglinton	51 00@53 00
Pig, American, No. 1	55 00@57 00
Pig, American, No. 2	52 00@53 00
Pig, American, Forge	48 00@49 00
Bar Refined, English and American	115 00@120 00
Bar Swedes, assorted sizes gold	120 00@130 00
	Store Prices, Cash.
Bar, Swedes, 1⅜ to 5 x ⅜ & ⅞ 2 sq. & 6 to 12 x ⅜ & ½	145 00@155 00
Bar, Refined, ⅜ to 2 in. rd. & sq. 1 to 6 in. x ⅜ to 1 in.	— —@120 00
Bar, Refined, 1½ to 6 by ¼	125 00@— —
Bar, Refined, 2½ to 2⅞ round 1 & 1¼ by ¼ & 5:16	127 50@— —
Large Rounds	127 50@140 00
Scroll	140 00@170 00
Ovals and half-round	140 00@160 00
Band	— —@135 00
Horse Shoe	130 00@140 00
Rods, ⅜ to 3-16 inch	125 00@165 00
Hoop	145 00@190 00
Nail rod	@ 9
Sheet, Russia, as to assortment (gold)	17½@ 18
Sheet, Singles, D. and T. Common	—7 @— 8½
Sheet, D. and T. Charcoal	—7¾@— 8½
Sheet, Galv'd, list 10 per cent discount	—@— —
Rails, English (gold), ℔ ton	75 00@— —
Rails, American, at Works in Pennsylvania, currency	87 50@ 90 00

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 4 cents ℔ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ℔ lb	— @— 43
Copper Bolts	— @— 45
Copper Braziers, 16oz. and over	— @— 45
Copper Nails	— @— 45
Copper, Old Sheathing, &c. mixed lots	26 @— 28
Copper, Old, for chemical purposes, 14@16 oz.	— @— —
Copper English Pig	32½@— 32½
Copper. American Ingot	33¾@— 33½
Yellow Metal, New Sheathing & Bronze	— @— 30
Yellow Metal Bolts	— @— 32
Yellow Metal Nails	30 @— 32

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 1½ cents ℔ lb:

Pipe and Sheet, 2¾ cents ℔ lb.	
Galena, ℔ 100 lbs	$— — @— —
Spanish (gold)	— — @6 45
German, do.	— — @6 45
English do.	6 75 @7 12½
Bar (net)	9 25 @— —
Pipe (net)	— — @11 00
Sheet	— — @11 00

Colwell, Shaw & Willard Tin-Lined Lead Pipe 15 cts. ℔ lb.

STEEL.—Duty: Bars and ingots, valued at 7 cents ℔ lb or under, 2½ cents; over 7 cents and not above 11, 3 cents ℔ lb; over 11 cents, 3½ cents ℔ lb, and 10 ℔ cent ad val. (Store prices.

English Cast (2d and 1st quality) ℔ lb	— 16½@— 20
English Spring (2d and 1st quality)	— 9½@— 10½
English Blister (2d and 1st quality)	— 11½@— 16
English Machinery	— 11½@— 13¼
English German (2d and 1st quality)	— 11½@— 12
American Blister "Black Diamond"	— — @— 11½
American, Cast, Tool do.	— — @— 17
American, Spring, do.	— — @— 11
American Machinery do.	— — @— 11¼
American German, do.	— 9 @— —

TIN.—Duty: Pig, Bars, and Blocks, 15 ℔ cent. ad val.: Plate and Sheets and Terne Plates, 25 ℔ cent.: Roofing 25. ad val.

	Gold ℔ lb.
Banca	40 @41
Straits	33 @33¼
English	33 @33¼

PLATES.

Fair to Good Brands.	Gold.	Currency.
I. C. Charcoal, ℔ box	$13 25 @13 50	$15 25 @15 50
I.C. Coke	12 00 @12 50	14 25 @14 50
Coke Terne	10 75 @11 25	12 25 @12 75
Charcoal Terne	11 50 @12 00	13 25 @13 75

SPELTER—Duty: In Pigs, Bars & Plates, $1.50 p. 100 lb

Plates, Foreign	(gold) p. 100 lb.	6 75 @ 7 00
Plates, Domestic	p. lb.	— 8 @— 11

ZINC—Duty: Pig or Block, $1.50 per 100 lb.; Sheet 2½c. per lb

Sheet	per lb.— 10½@ 11

San Francisco Stock Market.

BY TELEGRAPH.

NEW YORK, Sept. 12, 1872.

Our usual report from the San Francisco Stock Board was unavoidably crowded out of our last issue. Our report of to-day "which is dated the 10th inst." as compared with the telegrams received a week ago evinces a decidedly firmer feeling in the market than we have known for a long time past. We have also appended the report of the 5th inst. showing the course of the market for the two dates. From a recent statement of the Meadow Valley Mining Co. for the year ending July 31st 1872 we learn that the total production of Bullion for the year was $1,628,408.36 the expenses for the same period amounted to $933,076.97 leaving, a profit for the year's business of nearly $700,000.00. We feel safe in asserting that a corresponding exhibit could not be credited to all of the items on the San Francisco Stock list.

	Sept. 5.	Sept. 10.
Savage	— 117	131
Crown Point	— 122	140
Yellow Jacket	— 114	116
Kentuck	— 252	—
Chollar Potosi	— 70	69
Gould & Curry	— 142	—
Belcher "New Issue"	— 110	108
Imperial	— 9	8¼
Hale & Norcross	— —	—
Eureka G. V.	— 15	—

American Institute of Mining Engineers.

OFFICIAL BULLETIN.

Announcements to Members and Associates.

I. The dues for the year ending May, 1873, are now payable. All members and Associates who have not paid their dues are requested to do so at once, by sending in postal orders, or checks, or money, ten dollars to the Secretary.

All members and Associates who pay their dues for each current year, strictly in advance, will have sent to their address, regularly and weekly, the ENGINEERING AND MINING JOURNAL, which is the organ of the Institute, and will contain the proceedings and transactions, and all important papers read before the Institute and all notices of meetings. Back numbers cannot, as a general rule, be sent.

II. It is expected that the more important papers read before the Institute, and the debates thereon, will be published in annual or occasional volumes to which those Members and Associates will be entitled who have paid their dues.

III. All authors of papers are requested to notify the Secretary in advance of the meetings, giving the subject and length of their papers. Attention is also called, in this connection, to Rules 12 and 13.

IV. The ninth rule has been amended, so that there will be hereafter three meetings a year, in February, May and October. The meeting next October will be held at Pittsburgh, Pa.

Wilkesbarre, Pa. MARTIN CORYELL, Secretary.

LEHIGH UNIVERSITY,

Bethlehem, Penn.

FOUNDED BY HON. ASA PACKER.

DEPARTMENT OF MINING AND METALLURGY.

Instruction in all branches necessary to the degree of Mining Engineer. Any student who wishes to pursue special studies, without taking a degree, may ta[illegible]partial course. Tuition free.

The position of this institution in t[illegible]on mines and furnaces of the Lehigh Valle[illegible] of the mines and smelting works of th[illegible] within easy reach of the Anthracite C[illegible] nia, enables it to offer its students u[illegible] practical study of coal mining and th[illegible] of iron and zinc.

For further information address

B.

Professor

TUNGSTATE OF IRON imported specially for Stee[illegible] L. &

DEPARTMENT OF POPULAR SCIENCE.

Men with Bird-Shaped Skulls.

Dr. J. W. Foster, of Chicago, exhibited at the meeting of the Association for the Advancement of Science some strangely-shaped human skulls, and drawings of others. He said: There have been several skulls discovered in Indian mounds widely separated as to locality, which seem to have a common type utterly unlike those of any other known human crania. These skulls, taken respectively from two groups of mounds, about five miles apart, on the Des Plantes River, in the vicinity of Chicago; from the neighborhood of Merom, a station on the Cincinnati and Terre Haute Railway, in Indiana; and from the vicinity of Danleith, Illinois, just across the Mississippi from Dubuque, Iowa, present these marked peculiarities in the most extreme degree. In the first of the two groups of mounds near Chicago, portions of eleven skeletons were found; but only one skull and three frontal bones were sufficiently well preserved to admit of measurement and comparison. The other groups of mounds yielded human remains evidently belonging to two distinct eras, one of which must have been exceedingly recent. In addition to these were found, nearly on a level with the original surface, many skulls far gone in decomposition, and presenting peculiarities not appertaining to the existing Indian. To these Dr. Foster is inclined to assign an antiquity of several hundred years. Some of these relics are undoubtedly those of the mound builders, and are of the highest value to the antiquary.

So abnormal was the appearance of these skulls when first discovered, that Dr. Foster had difficulty in satisfying other investigators that these skulls had not been subjected to compression. But the shape is entirely different from that of the Indian skull or any other, compressed or otherwise. The skulls of Europeans (Caucasians) and of American Indians were compared with those of the Mound Builders. The Caucasian skull is developed more completely than the Indian in every direction, except in a line through the head, somewhat above the ears, and is somewhat boat-shaped; that of the Indian somewhat approaches the shape of a block with the corners rounded off. But the Mound Builder's skull is like that of a bird, and needs only a beak to complete the illusion. It rounds down equally from the apex to both front and back with no forehead worth naming.

The measurement of one of the Chicago skulls, as determined by Dr. Bridge, is as follows: Circumference, 20.25 inches; around longitudinal arc, 12.5 inches; vertical height above the glabello-occipital line, 3.8 inches; extreme longitudinal measurement, 7.6 inches; extreme transverse, 5.75 inches. The skull is not quite symmetrical. Its general outline is dolchico-cephalic. Its differences compared with a European skull are, notably: the large development of the superciliary ridges; the greatly depressed forehead; the occiput not merely flattened but forming an oblique line upward, while it occupies the extreme posterior part of the skull. Three skulls from the Kennicutt mound exhibited remarkably prominent supra-orbital ridges and peculiarly retreating foreheads; one of these being even a more retreating forehead than that of which the measurement is given above. "I think," says Dr. Foster, "that no man can view this fragment, with its great, massive superciliary ridges, its low, flat forehead and its thick, bony wall, without coming to the conclusion, that its possessor, when alive, must have been essentially a ferocious brute." Of two crania from the Hass's Park mounds, one is distinguished by almost the entire absence of a forehead; the orbital rings are sharp, without the least sign of a superciliary ridge; but the region of the glabella rises up in a ridge and the nasal bones are projected like the beak of a bird or of a garpike. The skull is only of the thickness of pasteboard. The brain capacity is not large. Without indorsing phrenology, Dr. Foster thinks it may be admitted that observation justifies the assignment of particular faculties to particular parts of the brain; as, the seat of the intellectual faculties in the anterior lobe; of the propensities which most link us with the brute, in the middle lobe; of those that appertain to the social affections, in the posterior lobe. Judged by these tests, we may infer that the Mound Builders were not as intellectual as the Indian, but less crafty and cruel.

Dr. Foster then went into an analysis of the peculiarities of ancient Peruvian and Aztec skulls, and compared them with North American Indian skulls and the skulls of the Mound Builders. The similarity between Peruvian and Mound Builders' skulls is noticeable. Dr. Lund, a distinguished Swedish naturalist, says: "The human figures sculptured on the ancient mounds of Mexico represent, for the greater part, a singular conformation of the head—being without forehead, the cranium retreating backward immediately above the superciliary arch. This anomaly, which is generally attributed to an artificial disfiguration of the head, or the taste of the artist, now admits of a more natural explanation, it being now proved by authentic documents that there really existed in this country a race exhibiting this anomalous conformation. The skeletons, which were of both sexes, were of the ordinary height, although two of them were above the common stature. These heads, according to the received opinion in craniology, could not have occupied a high position intellectually." Rivero and Tschudi believe that the artificial disfigurements of the skull among the Inca-Peruvians owe their origin to the prior existence of an autochthonous race having this peculiarity; and they further state that such peculiarities are in some cases congenital, having been found in the foetus in Peruvian mummies. As to the shape of the skull being produced by compression, Morton has pointed out that where this is attempted the volume of the brain is not diminished but simply transferred to parts of the head where the pressure is not applied. Dr. Foster has examined skulls of the Flathead and Chenook Indians where the forehead is depressed, but there is an enormous prolongation of the posterior region, and the line between the occipital protuberance and the intersection of the lamboidal sutures, instead of being vertical, as in the normal state, is curved outward so as often to bring the occiput point beneath the skull, and in a line with its base. The back-head of the Flathead Indian, as drawn by Dr. Foster on the blackboard, was not unlike that of the ladies of two or three years ago when the round waterfall on the back of the head was fashionable. But on examining the skulls of the Mound Builders it was evident that there was no such swelling at the back. The occiput forms the extreme posterior part of these skulls, from which the line of the cranium curves upward and inward. Moreover, it has been shown that wherever bandages have been used for depressing the skull, it is marked by bony ridges or depressions, which do not exist in the skulls in question. It may be safely asserted that there are certain coincidences in the configuration of the head between the primeval inhabitants of Brazil, the temple builders of Peru and Mexico, and the Mound Builders of the Mississippi Valley.

In the discussion that followed, Prof. Putnam thought we had scarcely a sufficient number of these low-browed skulls to assume that they were typical of the Mound Builders. A large majority of the skulls taken from these mounds were not of this extreme form at all—they were of the box-shape or Indian skull. At the utmost he thought that if there were originally a race of Mound Builders with low foreheads, it was absorbed or driven south again long before the Mound Builders, as such, ceased to exist. Prof. Winter announced a new locality of mounds and skulls in Michigan. A few specimens of the real Mound Builders' skull had been found there; not quite so much depressed as those shown here, but an intermediate form between the Indian and the extreme Mound Builder. Dr. Foster stated that Dr. Wallace collected sixty skulls from the Malays and found every variety of race form, apparently, among them. The skulls of any given race differ widely among themselves. He did not wish to be understood as saying that the Mound Builders were a race exclusively having depressed skulls; but he considered the coincidence of these numerous discoveries indicative of the fact that large numbers of men of this remarkable conformation must have existed among the Mound Builders.

Engineering and Mechanical Notes.

A commission appointed by the Belgium Government to enquire into the sanitary relations of chemical factories made some observations in its report upon the effect of chimnies upon the sanitary condition of the neighborhood. The conclusion arrived at was, that tall chimnies are worse than low ones. The former not only distribute their hurtful gases over a larger surface without removing them so far from the earth as to cause their perfect dilution, but from the greater speed of the gases within their flues, they prevent the condensation of many products which, with a slower current, would be cooled to their condensation point.

"Peace hath its victories," and the sewing machine has conquered the rifle. Our great arms manufactories, the most extensive small arm producing community in the world, are given up during peace to the manufacture of the more delicate parts of machinery. The Roper Arms Company make about 25,000 of Billing's sewing machine shuttles monthly, together with 75000 drop forgings. The Sharp Company's Works are now making the Weed sewing machine, and Colts Works make engines, pumps, sewing and agricultural machinery. The Pratt and Whitney Company are preparing to make arms for the Prussian Government, and other Companies still produce arms in large quantities, only the surplus energies of these vast establishments being devoted to other work.

There are certain chalybeate springs in Michigan which have gained celebrity from the report of a scientific man—by which, we suppose, a physician is meant—who found that the waters were magnetic. Accounts went about the country, in which the mysterious electro-chemical-physical powers of a water possessing magnetism were fully dilated upon. The spot in which the springs rise began to boast its hotels, and before the fire, when Chicago people had money, they all went there in the dog-days, and were cured. Dr. KEDZIE, of Michigan, in giving an account of the wells to a medical society, said that the *savant* who reported the presence of magnetism, based his statement on the observation that a piece of soft iron wire, connecting a cup of the water with the earth, was shown by the magnetoscope to be magnetic. Dr. KEDZIE had omitted the water in the same experiment, and found a similar result. He obtained the same proofs of magnetism from tubes that had not reached water, and it was evident that the magnetism was due to terrestrial currents. There are 150 of the wells, and the water, which can probably be neatly imitated by means of a paper of tacks and a bottle of Croton, has been sent in large quantities all over the country, no doubt to the happy release of many a sufferer.

Acoustic telegraphs offer some advantages for use in mines, since oxidation does not destroy their usefulness so soon as that of wires that are subjected to pulling. An apparatus of this kind has lately been put up by Professor WEINHOLD, in Chemnitz, Germany, and its length—670 meters, or about 2,200 feet—is quite as great as any shaft or gallery in most of our mines. It is necessary to insulate the wire with great care. At each end it has mouth-pieces, and words, spoken in an ordinary tone of voice, with the mouth at one of these mouth-pieces, can be distinctly heard, by applying the ear at the other. The line established at Chemnitz has succeeded perfectly. The fault of all such arrangements is that the telegraph is useful only to persons placed at either end. In case of an accident, or anything which can cause a necessity of signalling from the middle of the shaft, this system is useless.

THE ENGINEERING AND MINING JOURNAL.

ROSSITER W. RAYMOND, Ph. D.,
JOHN A. CHURCH, E. M.
Editors.

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THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.* It is the Organ of the American Institute of Mining Engineers, and is regularly received and read *by all the members and associates* of that large and powerful society, *the only one of the kind in this country.* It is therefore the best medium for advertising all kinds of machinery, tools and materials used by engineers or their employees.

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We call attention of our readers to advertisement "Wanting a second hand exploring or testing Diamond Drill."

THE National Association of Iron Manufacturers had a well-attended meeting at New York on Thursday. Most of the Members were from Pittsburgh.

We learn that the DORMOY'S mechanical puddler has been introduced in this country. The Catasauqua Manufacturing Company have just placed one of M. DORMOY'S machines on one of their furnaces. It has been worked but one day, for the sake of a first test, and the results are not sufficiently settled to be worth reporting. MR. EDGCOME, of New York, the agent, appeared before the National Association of Iron Manufacturers at their meeting in New York last week, and explained the machine and the method of working it.

Pennsylvania offers facilities for the practical study of mining which are probably better than any other State possesses. It not only has many mines and works, but, on the whole, there is more careful and scientific work done there than elsewhere. Its geological system, too, is under constant scrutiny, and has been studied by some of the best men in the country. For these reasons the Lehigh University offers especial inducements to the student of mining. Some of these, with directions for candidates, are specified in an advertisement we publish elsewhere.

WE intended to give our readers some account of the American Institute Fair, this week, but the Fair is so much delayed by the backwardness of exhibitors or managers, that it would be unjust to discuss it in its present condition. When will exhibitors pluck up a spirit in anticipation? Many men with inventions that would benefit greatly from the publicity of such an exhibition, are in doubt whether to put their discoveries before the Institute, and wait until they see how the Fair "takes." But when they see the real interest of the people in the display, and see other inventors busy with crowds of lookers-on, they hasten to repair their error and block the course of the exhibition. The character of the Fair is nearly as well settled before it takes place as after, and there is no reason for such doubtful hanging back.

We may believe in the reality of the Australian tin discoveries when we read that the 51,629 acres of tin lands taken up bear an annual rental of $60,000. Some of this land covers copper-mines, it is true, but most of it is "tin selections." The lands are in New South Wales, and the report speaks of very large discoveries. We hear a good deal, from time to time, of the shaky condition of the Cromwell mines, and how they are to see their last day in consequence of some new finding of tin in other counties. They manage, however, to maintain, what we believe is called in ecclesiastical parlance, their "visibility," and though we cannot give any idea of the profits their owners receive, the following list of the value of some of the mines, at the ruling prices for shares, is not indicative of failing confidence on the part of investors: Grenville £50,000 Treligh Wood £150,000, Van £700,000, Roman Gravels £200,000, East Llangquoy £200,000 and 17 others from £10,000 to £11,000. But it is by no means improbable that large discoveries of tin deposits, confided to the tender mercies of an active, pushing crowd of prospectors, all in haste to be rich, would in a short time contribute such a quantity of the metal to the world's stock, as would seriously depress values, and might throw these older and deeper mines in distress to keep up under the pressure.

The Coal Prospects of Colorado.

We published a few weeks ago a number of analyses of coal and iron ore found near Cañon City, Colorado. Some further facts respecting the real character and importance of these deposits may be of value in view of the interest so constantly expressed in the question of the utility of Western coals.

The Cañon City coal basin is situated about 38 miles from Puebla, up the Arkansas river, and at the base of the foothills of the Greenhorn mountains. It embraces about 44 square miles, in the form of an irregular triangle, with a length of 11 miles, and an average width of 4 miles. The manner in which it is bounded on all sides by the emergence to the surface of underlying tertiary and cretaceous rocks, forbids the expectation that extensions will be found anywhere in this neighborhood; but there is no reason to doubt that it belongs to the same formation with other beds in Colorado and Wyoming, and that the deposits of Trinidad, 100 miles south of Puebla, are its continuation in that direction, the intervening connection having been obliterated by the denudation of an anticlinal.

There are two workable beds of coal in this basin, an upper one, five feet thick, and another, about 120 feet below this, four feet thick. The former has been opened with a tunnel, which has scarcely penetrated as yet to any part of the bed under a solid rock roof. It is therefore not fair to pronounce finally upon the quality of the coal from the appearance of that which this tunnel has produced. But the Central Colorado Land Improvement Company, which owns the principal mines of the basin, has chosen to work the lower vein for the present, instead of this, because the coal in the lower vein has shown itself, even at the outcrop, to be remarkably pure, solid and fine, even under exposure to the weather. This upper coal will very probably improve as it is penetrated; at present, like most lignites, it cracks and crumbles on exposure, and doubtless decrepitates in the fire.

There is so much rock intervening between these seams, and it is apparently so firm, that possibly the lower one may, with suitable precautions, be worked without destroying the other. At any rate, the superiority of the lower coal to most or all of the other Western lignites, has given it a wide reputation and market, and has controlled the company's determination to open it extensively at once. It has been carried in small quantities for years about the West, as a blacksmith's fuel, and it has proved itself an extraordinarily good locomotive fuel, comparative tests having shown it to surpass the Boulder lignite in effectiveness (measured by the number of miles run to the ton) as 5 to 2. One ton of Cañon City coal was found to carry, on the Denver and Rio Grande railway, a train consisting of locomotive, tender, baggage-car and two passenger cars, one hundred and sixty miles over heavy grades—some sixty miles of this distance having an ascent of 75 feet to the mile.

A reference to our article on page 121, August 20, will show that there are some discrepancies in the results of the coal analyses by Dr. DROWN and Prof. COXE. It will be noticed that Dr. DROWN does not determine the proportion of water, and that Prof. COXE puts it at the incredibly low figure, for a lignite, of 4.50 per cent. It is to be wished that the analysis of the former had been more extended, and that of the latter more trustworthy. This is one of several cases in which Prof. COXE has pronounced upon the coking qualities of Western lignites opinions which practical tests have hitherto utterly failed to confirm.

Dr. DROWN'S statement with regard to the physical character of the fixed carbon is directly opposed to that of Prof. COXE, and is in accordance with the partial experience thus far gained. The only experiments with Cañon City coal, of which we have any knowledge, were made at the Denver gas-works, and resulted, on one occasion, in no coke at all, and on another occasion, in very little. It must be confessed, however, that the best conditions for making coke are not found in the gas-retort; and it remains to be seen whether an ordinary coke oven would produce a coherent coke.

Another metallurgical possibility, as yet untested, is suggested by Dr. DROWN—namely, the use of the Cañon City coal in its crude state, as the Indiana block coal is used. We cannot be over-sanguine about this plan, though it is confidently asserted that the coal does not decrepitate in the fire, and will bear a burden in the shaft-furnace. If any lignite will do it, it is the lignite of Cañon City; for it resembles the best "pitch-coal." There remains to be mentioned its use in ordinary reverberatories and in furnaces with gas-generators. For reverberatories, it will probably prove better than any other Rocky Mountain coal so far tried, save perhaps that of Rock Springs, in Wyoming. In gas-generators they can all be used; but for that purpose there would be some advantage in the superior purity and density of the Cañon City coal.

These facts and suggestions concern an important question—namely, that of the iron manufacture. In the neighborhood of Cañon City occur deposits of magnetite, an analysis of which we gave in our former article.

There is also in the coal-basin a layer of iron ore, shown in a thin scattered outcrop of nodules of brown hematite, between the two coal seams. It will probably prove to be an argillaceous carbonate (spherosiderite) when worked beyond the outcrop. Whether it is thick enough for extensive working it is impossible to say from its present appearance. It would certainly do well to mix with the magnetites, and the two, together with the coal, *if the latter can be used in any*

way in blast furnaces, indicate a bright future for this point as a great iron-making center. At all events, there is little doubt that the re-rolling business, destined to be one of great importance in connection with railroad enterprises in the Territories, can be successfully established there.

The Denver and Rio Grande Railway, now finished as far South as Puebla, on the way to Mexico, will be connected with Cañon City by a branch, early this fall. At present a small production of coal is being hauled by return freight trains, 38 miles to Puebla, for use on the railroad; but the mines are being opened as rapidly as possible for a production of 200 tons daily. This will probably not be reached by the time the railroad connection is completed; but the only difficulty is the lack of skillful miners. MR. R. NEILSON CLARK, the engineer in charge, is conducting affairs with great energy and intelligence; and there can be no doubt that the Cañon City coal will make its appearance in two months in the Denver market, to compete with the Boulder coals. It will be probably somewhat higher in price; but it is expected to win the day by its superior quality. However there will be no monopoly, as even 200 tons a day would not supply the demands of the five railroads centering at Denver.

A German Order for American Locomotives.

A good deal of interest was awakened among iron-workers and railway men by the report that a large order for locomotives and cars had been received by a Pittsburg house, *from Germany*, and we are indebted to the *Iron World* for an elucidation of the mystery.

"The order came from the German government, through the Consul General representing that government in New York. The Emperor WILLIAM has lately begun, and will soon complete, a long line of railway within his dominions, which, it is contemplated, will be managed upon the same system as are the railroads in America. To equip the road fifty locomotives and two thousand cars are required of the American pattern. These at present can probably be built somewhat cheaper in Germany than in this country, and but for special considerations would have been built there from drawings and specifications obtained this side the ocean. But the activity of the German people, aroused by the war; the vast stride which the country is taking toward that stage of prosperity and civilization whose influences and tendencies point to a republican equalization of interests, have so hampered the workshops with orders, that it was found impossible for so large a demand upon the skill and capacity of the mechanics to be met by the time it was absolutely necessary it should be met. Another consideration also impelled the government to send the order to us. The war and the subsequent busy state of affairs, together with unusual emigration, have made labor scarce, and in many sections of the country a disposition has manifested itself among the workmen to seize the opportunity for a general strike for increased wages. The importation of manufactured articles of so much value, would give the malcontents an impression that it was possible for America to compete with them, and this, it was thought, would not only prevent an attempt of the trade unions to unsettle affairs, but would also have a tendency to impel manufacturers to greater exertions that their trade might be kept to themselves. Thus, the saving of time, and the moral effect upon the workmen of Germany, were, in the eyes of the government, considerations greater than the pecuniary difference in favor of the home manufacture.

It is a compliment to the enterprise and zeal evinced by Pittsburgh merchants in all matters of manufacturing, that the locomotive works of this city were first offered the order. As, however, the reservation was made that the contract must be fulfilled within three months, this establishment was obliged to decline it. Subsequently, after other large establishments in the United States had also announced their inability to complete the work within the time specified, a second proposition was made to Mr. Stewart. One year would be given in which to fill the order. The locomotives and cars might be made in every respect in accordance with the American models, which would permit the ordinary patterns to be used, and thus time be saved.

Mr. Stewart again was obliged to decline the contract, as a large influx of home orders had in the meantime engaged the entire present capacity of the works, as well as the prospective capacity for a year to come. The order has since been distributed among various establishments in the East. BALDWIN & Co. will make fifteen of the locomotives; MASON'S works at Taunton, Massachusetts, will turn out nearly as many more, and the rest will come from various smaller works."

Our contemporary thinks it is not impossible that a regular demand for American railway material should spring up in Europe. There are certain points of construction which are carried out in a cheaper way in America than in Europe, such as the manufacture of driving-wheels and boilers, and as these are large elements in the cost of the work; the price of the finished locomotive is brought much nearer that usually asked abroad, than it would be if we were to exactly reproduce the foreign machine.

There are circumstances which make the ordering of American engines for European roads far less surprising than it might at first seem. High prices are not confined to England. All over the continent there has been a marked advance in wages, together with such an increase of business that the workshops can hardly hold their own. It has long been apparent that American and European prices for labor were destined to approach each other more closely, but we believe it has been usually thought that increased population would cheapen labor here. But the wonderful receptivity of our country forbids that, while the enormous production of gold, the lessening of population abroad, and the colossal armies kept on foot, have brought about a change on the other side. Two of these causes at least are permanent. Gold will probably bear a lessening value, as the mines of Australia and America continue to be worked; and it must be many years before the withdrawal of workmen from the old to the new world ceases to be serious.

European manufacturers, especially the British, are now experiencing a little of the difficulty our own makers have labored under. Our markets have been at the command of any country which kept down the wages of its workmen. If those wages once take a permanent advance we shall certainly reap the advantage, and we shall no longer see a country of only moderate resources like England, straining every nerve to supply the most richly furnished land in the world with products that can be better made within its own borders.

EDITORIAL CORRESPONDENCE.

The Winnemuck Mine and Works.

SALT LAKE CITY, Aug. 20, 1872.

A recent visit to Bingham cañon made me acquainted with the mine and smelting works operated by Messrs. BRISTOL and DAGGETT, about 25 miles from this city. The establishment is compactly built and arranged, mine, furnaces and office being within hailing distance, and the ore being lowered directly to the furnaces by an inclined tramway from the mouth of the windlass drift in the side of the mountain. The mine comprises 2000 feet on a vein running N. 76° W. and dipping northerly into the mountain. The course of the outcrop on the mountain side is nearly N. W. The general dip of both vein and country is about 45 deg. The hanging wall is usually a belt of soft bluish rock (siliceous clay slate?) but sometimes quartzite; the foot-wall, like the general country rock, is quartzite. The ore is distributed in chimneys or bodies in the vein, and consists of carbonate of lead and galena, with subordinate associated minerals and siliceous gangue, carrying about 38 per cent. of lead and 56 ounces of silver per ton, as shown by the furnace assays of nearly 1300 tons.

The underground works consist chiefly of the discovery shaft, 65 feet deep, a drift from it, thirty feet long, an incline from this drift 130 feet deep, and a shaft 75 feet deep from the bottom of this incline. The windlass-drift above mentioned, through which the mine is worked at present, enters the face of the mountain on a level with the drift above mentioned. About 150 feet vertically or 200 feet inclined, below the windlass-drift, a tunnel has been run in 600 feet on the contact-plane between the blue hanging wall rock and the quartzite. This tunnel is not a part of the producing mine at present. It is carried on to prospect the character of the vein in depth. Thus far, it has developed no carbonate ore like that above, but a vein of mixed galena and iron pyrites is shown in it, which will be followed upwards by winzes. The discovery indicates the continuance of the contact-vein in some form at greater depths than those now worked.

The average thickness of the vein is something over four feet—maximum, twenty. Two bodies of ore have furnished the amount hitherto extracted The first was about 100 feet long by 250 feet in depth on the vein, The second, a small, rich body, was about 20 feet long by 60 feet deep and 2½ feet thick. Out of these bodies there have been extracted and reduced, from August 1, 1871 to June 30, 1872, about 2200 tons of ore, yielding a net profit of $80,000. The mining cost is very small, as the vein matter is thoroughly decomposed and can be removed without blasting, while at the same time the stopes and drifts do not require expensive timbering. The reserves of good ore still standing in the mine are considerable in amount.

Smelting in this locality is of course expensive. Charcoal costs (freight and waste included) something over 30 cents per bushel; iron ore (the pure red hematite brought from Rawlins, Wyoming Territory) $22 50 to $25 per ton; limestone, $7 per ton. Fire bricks are brought from Golden City, Colorado, or even from Illinois. As the charge of the furnaces consists of about 13 parts ore, 4 parts iron-ore, 5 parts limestone and 6 parts charcoal, with two parts old slags, it will be seen that the *Beschickung* is highly expensive. In respect of completeness of extraction, the works are doing excellently for this region, the total losses in treatment being 6.4 per cent. of the lead, and 5.3 per cent. of the silver contained, as per fire assay, in the ore.

The works comprise two Pilz furnaces, 14 feet in height from the tuyeres to the feed-hole, 3½ feet in diameter at the tuyeres, and 18 inches in thickness of walls. There are six tuyeres, with 2½ inch nozzles. The slag-discharge is ten inches below the tuyeres—a point strangely overlooked in most of the Utah furnaces, where the blast is usually directed almost upon the lead. The automatic syphon tap is employed. Blast is furnished from the Root blowers. They have been worked up to a pressure of two inches of mercury; but the usual pressure is 1½ inches.

The principal trouble in running the furnaces is the shortness of the campaigns, which are terminated either by the formation of "salamanders," or by the burning out of the walls. The latter is the most serious evil; and it is rendered more frequent by the employment of so much iron ore, and the formation of a basic slag (probably a singulo-silicate at least) which attacks the fire-bricks. It is said that the bricks made *this year* at Golden City are unusually liable to be slagged away. This may be the case; but I fancy the constitution of the slags, and the high temperature and pressure sometimes employed to prevent or remove salamanders, are sufficient causes for the rapid consumption of the walls. Two weeks appears to be frequently the limit of a campaign.

The extra expense incurred by this method of running is partially balanced, at least, by the increased quantity smelted per diem. One furnace will reduce about 14 tons of ore daily, producing about 5 tons of bullion, worth in silver about $153 per ton.

Just at present, the mining and smelting business in Utah are highly favored by the extravagant prices paid at Salt Lake for both ores and bullion by the competing agents of rival establishments, particularly in St. Louis and Chicago. These agents may understand better than any outsider what they are doing; but it certainly seems as if they could not maintain a profitable business and pay for their

crude material so recklessly. A couple of examples will illustrate my meaning.

Last week thirty tons of bullion from the Saturn Smelting Works, near this city, were sold here to the highest bidder. It contained by assay 99.16 ounces silver and 0.3 ounces gold per ton. The price paid (by the agent of the Chicago Smelting and Refining Co.) was $231 31 per ton. Assuming the value of the lead here at 4½ cents per pound (all it is worth in Salt Lake), and reckoning $6 20 per ton for the gold, this would be $1 41 paid *here*, for each ounce of silver! or, looking more closely into details:

At $1 34 per oz., the silver would be worth per ton of bullion at Chicago, after separation, $132 08 coin or $151 52 currency. The lead at 7 cents would be worth $140, and the gold, say, $4 net. Total, $295 52, value of bullion per ton in Chicago. On the other side of the account, we have the price, $231 31, paid for the bullion, freight to Ogden $2 50; to Omaha $20, to Chicago $6; total freight, $28 50; cost of treatment, say $12 per ton; loss, say 5 per cent., or $11 50 per ton; total cost, $283 31, leaving a margin of only $12 21 for commissions, interest, risk and profits. This margin I think any metallurgist would consider dangerously small for the time and place.

The same establishment has been buying ores in the same style. Two hundred tons of Emma ore were recently sold, assaying 67.8 ounces silver per ton, and 47,5 per cent. lead. For this ore the agent of Selby's San Francisco works bid $64 53 per ton; other parties bid $70 and $72, but the Chicago works carried it off at $84 per ton! Add to this the freight ($25 for ore), smelting cost $20, refining $12, and loss $14, and you have a total of $155 paid per ton. The silver at $1 34 and the lead at 7 cents, amount together to $157 35, leaving a margin of $2 35!

The last sale of Emma ore, made to-day, was even less favorable to the buyer. The amount was 100 tons, assaying 67 ounces silver per ton, and 48 per cent. lead. It was bought for St. Louis at $85 50, leaving, according to the figures above given, only 48 cents margin per ton. Silver is probably worth, just now, more than $1 34 gold per ounce; but this difference is not enough to render smelting at these figures an inviting business. The present competition is evidently unsound. It is a struggle among rival concerns to gain possession of the whole Utah market; and it is safe to prophecy that it will result, either by the triumph of one party or the exhaustion of all, in a reaction of prices to a level more in agreement with business caution and permanent success. Meanwhile, it is a rich harvest for the ore and bullion sellers of the Territory. BRISTOL and DAGGETT must be making an additional profit of $125 daily out of the high price of bullion; and even the very cheap bullion of the Utah Company's furnaces, further up the cañon, may now find a better market than it ever had before or is likely to have again. R. W. R.

Researches on the Consumption of Heat in the Blast Furnace.

By RICHARD AKERMAN.

Translated by FREDERICK PRIME, Professor of Mining and Metallurgy, Lafayette College, Eaton, Pa.

(*Continued from Page* 115.)

VII. In order that the following calculations with regard to heat might be adapted, so far as possible, to the conditions of the Swedish blast-furnaces, the author has attempted to conform the necessary assumptions to the conditions existing in the best Swedish practice.

Consequently, a furnace was chosen which is 42 feet high, blowing with two tuyeres, and having an internal diameter of 25 inches, and it was assumed that the charge of charcoal amounted to 360 lbs. The charcoal consists of

82	per cent.	carbon,
2	" "	ash,
10	" "	water,
6	" "	other gases, which are expelled at high temperature, which latter consist according to the researches of RINMANN and FERNQUIST of

55·9	per cent.	carbonic acid,
22.8	" "	carbonic oxyd,
11·8	" "	marsh gas,
1·0	" "	hydrogen, and
8·5	" "	nitrogen.

It is also assumed that a burden of 8 cwt. is added to such a charge of coal, that the furnace makes 1,600 cwt. of pig iron weekly, that the burden contains 15 per cent. carbonate of lime, and that the ore consists of equal quantities of peroxyd and magnetic oxyd of iron, or $Fe_5 O_7$. It is further assumed that there is obtained 45 per cent. of iron and 35 per cent. of slag from the entire charge, hence we can calculate the consumption of fuel on 100 lbs per cwt. of pig iron produced. The pig iron is assumed to contain 4·2 per cent. carbon, and 0·25 per cent. silicon.

It is also assumed (in accordance with the average temperature of Sweden) that the temperature of the atmosphere is 5°C., that the temperature of the hot blast is 200°C higher, with a pressure of 1 7-10 inches of mercury, and that it contains an amount of water corresponding to the outer atmosphere and height of the barometer, consequently the composition of the blast is (by weight)

23·04 oxygen	or	23·54 oxygen,
0·56 water	"	0·06 hydrogen,
76·40 nitrogen	"	76·40 nitrogen.

The average temperature of the escaping gases is taken as being 450°C., which is not too high, as the materials charged are assumed to be dry, and the ascending gases, especially in the upper portions of the furnace, are considerably hotter than the descending solid contents which are being heated up. Besides which it must be borne in mind that in the majority of the Swedish blast-furnaces the gases are for the greater part removed at some considerable distance below the tunnel-head, in order to be used for other purposes, and generally at the high temperature of 800°C.

VIII. Prior to passing to the direct calculation, it is necessary to give some requisite figures.

The heat evolved per weight unit of the substance combining with the oxygen, is here assumed as follows:

For carbon by its combustion to carbonic acid	8,080 cal.
For carbon by its combustion to carbonic oxyd	2,473 "
For carbonic oxyd by its combustion to carbonic acid	2,403 "
For hydrogen by its combustion to water.	29,638* "
For silicon by its combustion to silicic acid	7,830 "

The heat evolved per weight-unit of caustic lime by its combination with carbonic acid, is assumed to be, according to SCHINZ, 197.1 cal.

The heat absorbed by the reduction of iron ores in the oxidation of carbon to carbonic oxyd has been found to be 2350 cal. per weight-unit of oxygen, it is therefore per weight-unit of carbon $2350 \times 16 \div 12 = 3133.3$ cal.

The specific heat of oxygen at a constant pressure is 0.2182

"	"	nitrogen	"	0.2440
"	"	hydrogen	"	3.4046
"	"	steam	"	0.4750
"	"	carbonic oxyd	"	0.2479
"	"	carbonic acid	"	0.2164
"	"	marsh gas	"	0.5929

The fusing heat of ice is 79 cal., and the evaporating heat of water 536 cal.

The combining weight of	hydrogen	is	H = 1
" "	carbon	"	C = 12
" "	oxygen	"	O = 16
" "	calcium	"	Ca = 40
" "	silicon	"	Si = 28
" "	iron	"	Fe = 56

One pound of the charcoal charged has been taken as the weight-unit, serving as the basis of all the following calculations; therefore, both the production and consumption of heat are always reduced to 1 lb. of the charcoal consumed in the furnace.

Of the pure carbon contained in the charcoal $4.2 \times 100 \div 82 = 5.122$ p. c. is combined with the pig iron; and if, in accordance with RINMANN's researches,† it be assumed that 12 p.c. of the carbon in the charcoal is used in reducing the iron ores, there remains of each one pound of charcoal charged into the furnace only $0.82 - (17.122 \times 82 \div 100) = 0.6796$ lbs. of coal to be burnt by the blast.

In order to burn this amount of carbon to carbonic oxyd, which is the final product of the carbon burnt by the blast, it is necessary to have $0.6796 \times 16 \div 12 = 0.90613$ lbs. of oxygen, which is contained in $0.90613 \div 02354 = 3.84933$ lbs. of air; and in accordance with the previously adopted composition of the air this quantity contains 2.94089 lbs. nitrogen and 0.00231 lbs. hydrogen. Only 0.88688 lbs. of the amount of oxygen occur in a free state, however, as the remainder (0.01925 lbs.) is combined with hydrogen to form 0.02156 lbs. of water.

* The heating power of hydrogen is generally assumed to be 34,462 cal., but in such calculations as these the evaporating heat of the water formed ($9 \times 536 = 4,824$ cal.) must be subtracted.

† See Jern—KONTORETS' Annaler for 1865.

MINING SUMMARY.

Idaho.

The Owyhee *Avalanche* of August 31 has the following Local Mining Record:

We took our usual tour over War Eagle Mountain this week; and, from careful personal obervation of the various mines and the large amount of work going on, we feel justified in asserting that the mining prospect of our camp is brighter and more encouraging than for several years past. Not only are new mines of great promise being opened up, but long-suspended operations in several of the older claims have been resumed, and are being pushed forward with the utmost confidence and energy. Enterprises formerly abandoned on account of losses entailed through inexperience and the then prevailing high prices of labor and material, have lately been resuscitated with every prospect of fully realizing the hopes of their projectors. Owing to the reduced cost of the cardinal elements of production, more perfect knowledge of the business, and a greater economy and caution in operating, our mill-men are enabled to work a lower grade of ore with profit than formerly they were able to do. Taking everything into consideration, the miner, the merchant, and our own citizens generally, have reason to rejoice over the season of prosperity that is now about to dawn upon our camp.

We find the War Eagle mine in active operation under the management of JOHN WILSON, foreman. The underground force numbers 30 men—24 in the stopes, and 6 sinking the shaft, which is being put down for the 5th level on the 2-foot vein of splendid quartz. In the 3d and 4th level stopes north, there is a good vein averaging fully 20 inches in width throughout. The face of the 3d level is being driven in on a fine looking 2-foot vein. The general prospect in this level shows well for the future of the mine. In the 4th level stopes south, the vein is about 30 inches wide, of decomposed quartz, charged throughout with mineral in various conditions—black and blue sulphurets, chlorides and oxides, with free gold. It is estimated that this ore, if milled by itself, would pay from $200 to $600 per ton. The ore shute contains 100 tons, or more, just taken from the mine. The Owyhee mill commenced working War Eagle ore on the 28th inst,, and has some 120 tons on hand. The new hoisting works operate splendidly and everything in and about the mine is kept in tip-top shape. We consider the present prospect of the mine very flattering, and look soon to see the stock advance to higher figures.

The Empire is attracting much more than usual attention at present. They are hoisting and milling 20 tons a day, and Superintendent MINEAR thinks that in two or three weeks from now he will be able to increase the amount to 30 tons a day. From the 2d to the 3d level they have 100 feet of backs south of the shaft, and 250 feet north, above the 2d level (or to the surface) to stope out. The north drift on 2d level is now in 80 feet from the shaft, and the south drift 60 feet. The winze is about 150 feet south of the shaft, and there is 40 feet of drift yet to run to connect them, which will take 10 days to complete. When this is done there will be more stoping ground opened in the Empire than in any other mine in the District. The shaft is down 20 odd feet for the 3d

level, carrying with it a 4-foot vein. Great credit is due to W. J. Hanks, the foreman, as well as the Superintendent, for putting this mine in its present condition, and we are truly sorry to learn that Mr. Hanks has concluded to resign his position, and go to Southern Nevada to look after some mining interests he has acquired in that State, through a friend of his. J. H. Thomas, another excellent miner, takes the place of Mr. Hanks, as foreman of the Empire.

The Minnesota has cut a new ledge in their 4th level drift, crossing the main vein at an angle of about 45 degrees. The new discovery is very rich in gold, and is supposed to be a continuation of the Red Jacket vein. If it continues as it looks now we may expect better results from the Minnesota, than for a long time. The shaft has been let on contract to sink another 100 feet for the 5th level. The two last crushings of ore paid $26 and 28, respectively, per ton, which is an improvement on former crushings.

Calling at the Red Jacket, we were very courteously conducted through the mine by Humphrey Lynch, who, we were pleased to learn, has been promoted from a miner to the position of foreman of that mine. Mr. Lynch is a miner of long experience in this camp, is a sober, industrious man, and his selection for the position shows good judgment on the part of the Red Jacket Company. The north shaft is down about 90 feet and the south shaft 60 feet. Both shafts have all along shown a vein from 2 to 2½ feet wide of high grade gold-bearing quartz, but on Tuesday evening last, it was struck richer than ever in the bottom of the south shaft, where we were astonished to see a large pay streak of free gold as well as silver glistening in the light afforded by the miner's candle. Quite a number of persons have already visited the "rich strike," and, as well as ourself, were surprised at its richness. The owners of the Red Jacket are lucky men. If their mine continue as good as at present, and the chances are that it will improve, they will be able to retire on handsome fortunes.

Rich strikes are the order of the day here now. Hearing that something good had recently been found in the Pauper, we paid that mine a visit on Wednesday. We were kindly received and cheerfully shown around by our old friend Jim Pheby, who is foreman of the mine. From what we had heard we were prepared to see rich ore, but not half so rich or extensive as we found it. From the bottom of the shaft, which is 152 feet deep, a drift has been run south 103 feet. In this drift, 20 feet south of the shaft, the rich body of ore was struck, reaching to the end of the drift 83 feet, and how much farther of course is not known. The vein is about a foot in width, the whole of which will compare favorably with the richest silver ore in Owyhee. North of the shaft the ore has been stoped out for a distance of 35 feet, and the rich ore, south of the shaft, is also being taken out. The mine is easily worked, little or no blasting required. Mr. Pheby could take out ore very rapidly if he had proper hoisting facilities. As it is, he only has an old rattletrap of a whim, which makes slow work of it. With the encouraging prospect now before them, the Pauper Company would certainly be vastly the gainers by erecting steam hoisting works at once. The ore now on the dump—about 90 tons—will doubtless pay all expenses yet incurred in working the mine. Since the rich strike has become known, numerous orders have been sent to San Francisco for stock.

Charley McFadden piloted us through the Mahogany, which we found looking splendidly. The 6th level winze, south of the shaft, is down some 100 feet, from the bottom of which a drift is being run to connect with the shaft, which is also about completed for the 6th level. In the winze the vein is fully two feet wide of ore stuck full of free gold and sulphurets of silver—very much resembling Ida Ellmore and Golden Chariot in the days when they paid the best. Fine looking ore is also coming out of the 4th and 5th levels. The Superintendent is confident of being able to make the mine pay a handsome dividend as soon as the 6th level is properly opened and a crushing or two can be had. The Ellmore mill is running on Mahogany ore.

The new shaft being completed and the water all out, sinking for the 9th level has actively been resumed in the Golden Chariot.

Superintendent Miller has secured the services of our old friend Michael Hyde, as foreman, at the Ida Ellmore. Mr Hyde has acted in the capacity of mining foreman here for a number of years, and understands his business. An immense water tank is being constructed in the 8th level of the Ellmore in which will be collected the water from the entire mine. When this is done, sinking the shaft for the 9th level will be resumed and stoping commenced.

Since our last issue Mr. C. S. Miller has been appointed Superintendent of South Chariot, and informs us that he will immediately let contracts for sinking, running drifts, &c., that mine. Mr. Miller takes the place of Mr. Minear, and will vigorously continue the work got under way by his predecessor. Under the management of Mr. Minear a large amount of work has been done in opening up the mine—the shaft set back for some 150 feet, or to the 4th level, and sunk and nicely timbered to the 5th level; the 5th level drift runs from the south line to the shaft, most of the way through fair looking ore; the 6th level drift runs in from the south line 136 feet, and the shaft raised from that level 36 feet, leaving only 70 feet of shaft to sink between the 5th and 6th levels, with 100 feet to be timbered, in order to put the mine in good shape for taking out ore. The shaft is in splendid condition—well timbered, with slide boards for buckets, and ladder road from top to bottom. This has been done with the earnings of the mill working on custom ore, which gives the South Chariot Company a great advantage over many others in camp, and saves the superintendent from calling for money from San Francisco to open and develop their property. Situated on the same belt of mineral, if, indeed, not on the same vein, as the Ida Ellmore, Golden Chariot, Minnesota and Mahogany, we confidently expect to see the South Chariot wheel into the line of divident paying mines.

Nothing new to report this week in the Illinois Central, Union, Sportsman, Revenue, or Morning Star. Work is going on briskly in all of them.

Arizona.

The San Francisco *Scientific and Mining Press* of August 24, says:

The diamond excitement in this city seems to be pretty fully kept up, even if it does not increase in intensity. It is wonderful how many people are coming to the surface, who know all about the occurrence of precious stones in the region towards which so many eyes are now directed, and with such anxious hopes of prospective fortunes, and yet who never before thought of it. Five different companies have already been formed in this city; also one at Salt Lake City, one at Virginia City, and one in Arizona, to proceed to, and hunt for diamonds, etc, in the new Arizona diamond fields. These companies may be enumerated as follows:

1. The Roberts-Harpending Co., who have men already on the ground and contemplate sending out a small party with supplies, etc,
2. The Miner Company, now nearly ready to start.
3. The Catlin Co., who go out under the command of Mr. Catlin, who has spent four years in that region in the U. S. army employ, and who is thoroughly acquainted with the same, and with the Indians and their habits, etc. Mr. C. informs us that, when there, he often met with various precious stones, many of which he brought home with him as curiosities, but ignorant of their value.
4. The Gen. Ihre Co. The general is acquainted with the country, having passed some time there in passing through with a battalion of U. S. troops some years ago.
5. The Greenberg Co., made up mostly, if not entirely, of Hebrews.
6. The Salt Lake Company, already on the road.
7. The Virginia City Co., who are about ready to send out a party with a guide well acquainted with the country.
8. The Spencer Company—a private association of wealthy gentlemen in Arizona, several of whom have already visited the region on other business. This is not a stock company; all the members (five in number), go personally, taking with them such laborers and assistants as they may desire. This party is also by this time probably well on their way to the new Golconda.

All the parties from this city go under strict military discipline, armed to the teeth and fully equipped for all anticipated emergencies. They go for a year's stay. It is probably not safe to go in parties of less than twenty-five to thirty, and then there will probably be some arrangements by which one or more parties will be constantly within supporting distance.

DENISON'S COOLING AND LUBRICATING Compound will immediately cool a hot journal while in motion. Send for a Circular.
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WANTED.—A second-hand Exploring or Testing Diamond Drill. State lowest cash price.
Address P. O. Box 1644, New York. Sept. 17:2t

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The best dry coals shipped, and the promptest attention given to orders. sep21-1y

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AGENTS:
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Among the consumers of Despard Coal we name Manhattan Gas Light Co., New York; Metropolitan Gas Light Co., New York; Jersey City Gas Light Co., Jersey City, N. J.; Washington Gas Light Co., Washington, D. C. Portland Gas Light Co., Portland, Maine.
☞ Reference to them is requested. may30-1y

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The editorial staff will be under the direction of L. DE COLANGE, LL. D., so well and favorably known as the editor of "ZELL'S ENCYCLOPEDIA."
The publisher will spare no pains or expense to make this magazine well worthy the reading public, and has placed the subscription price so low as to be within the reach of all.
Subscription price, $2 00 per annum.
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A specimen copy will be sent to any part of the United States on receipt of 10 cents in postage stamps.
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P.O. Box, 5,292, New York.

j23:2m

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10	$ 4 60	1-10	$ 1 60	15	$ 1 60	1	$ 1 15
20	16 20	5-10	8 90	20	3 95	5	8 05
30	28 90	1	17 80	25	7 10	10	19 60
40	40 45	1½	27 05	30	11 10	15	31 85
50	52 05	2	36 60	35	14 15	20	45 45
60	63 80	3	55 20	40	17 25	25	58 80
70	76 60	4	73 35	45	20 20	30	72 00
80	87 90	5	92 10	50	23 50	40	96 20
90	100 60	6	111 40	55	26 30	50	127 35
100	111 70	7	129 80	60	29 50	60	155 70
110	124 40	8	148 15	65	32 85	70	185 00
120	137 20	9	168 30	70	36 30	And so on.	
130	148 55	10	186 80	75	39 50		
140	161 10	11	205 30	80	42 85		
150	173 60	12	225 45	85	46 25		
175	205 10	13	244 10	And so on.			
200	234 45	14	263 30				
225	265 85	15	283 85				
250	297 35	20	379 90				
275	329 70	And so on.					
300	361 50						
350	424 20						
400	486 25						
450	549 50						
500	613 75						
And so on.							

NOTE.—In the Original Tariffs the ton of ore is equal to 20 cwt. = 2240 lbs. English, whilst in these tariffs only 2000 lbs. avoirdupois are taken to the ton—thus 291,63 ounces troy of silver or gold in the ton are equal to 1 per cent. For silver contents above 1 per cent. (300 ounces in the ton of 2000 lbs.), generally 2 per cent. are paid in addition to the tariff prices.

The tariffs for Lead and Copper are based upon an average price of 5½ thalers for 100 German pounds (about 3½ cts. gold per lb. English) for Lead, and of 75 thalers for 100 German pounds (about 16¼ cts. gold per lb. English) for Copper; in case the actual prices are higher, the difference is paid extra. At the present time (August), for instance, $71 coin are paid in addition to the tariff prices for 2000 lbs. of Copper; and $13 coin in addition to the tariff prices for 2000 lbs of Lead.

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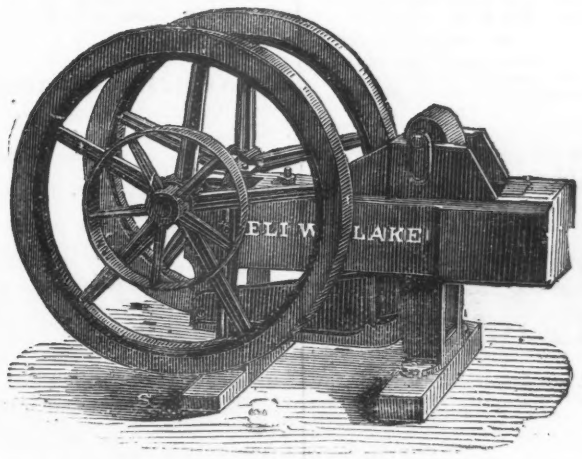

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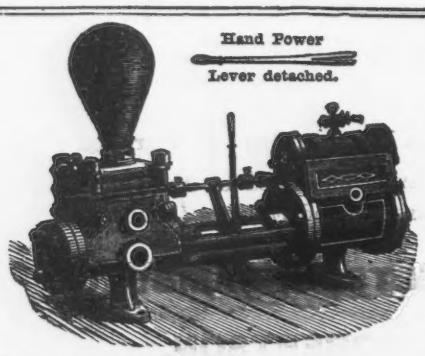

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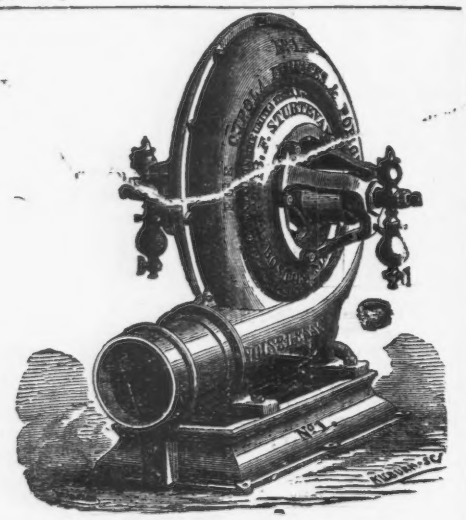

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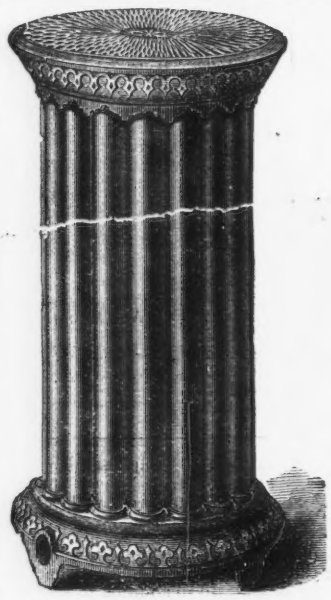

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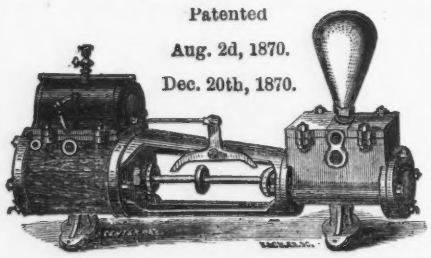

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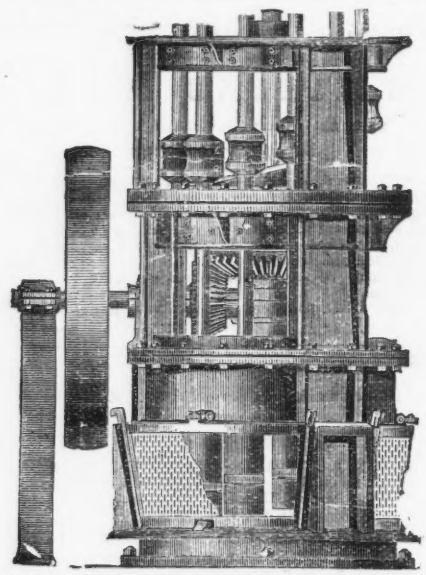

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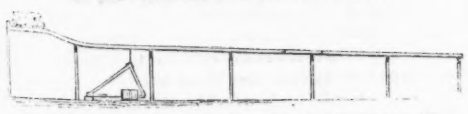

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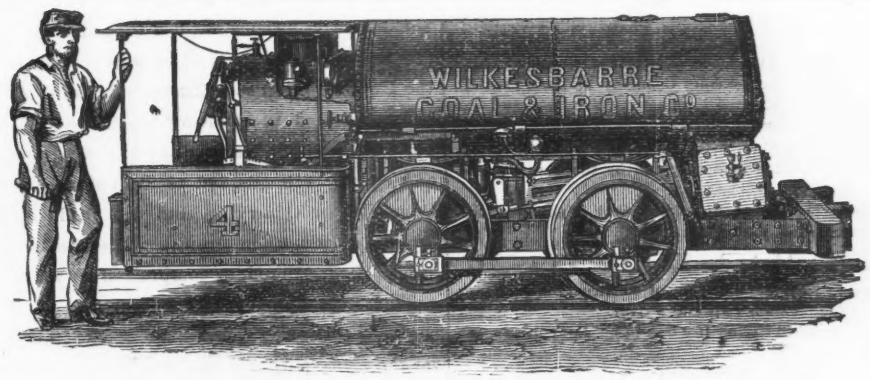

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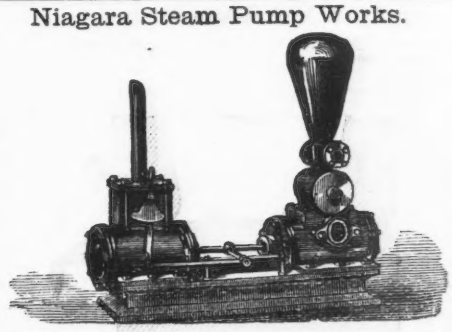

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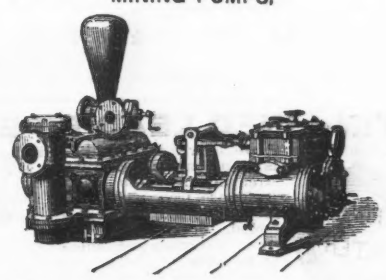

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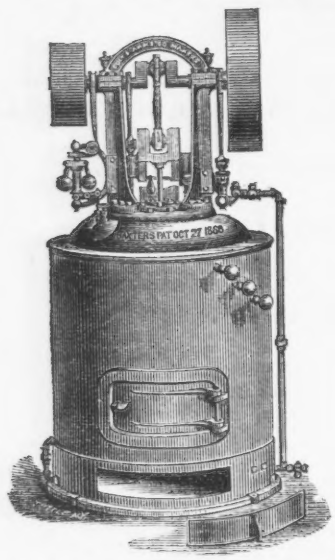

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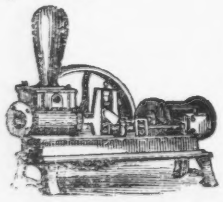

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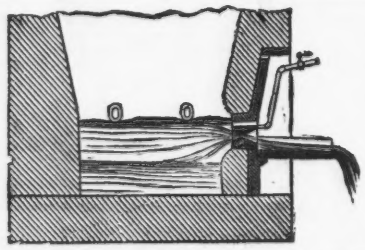

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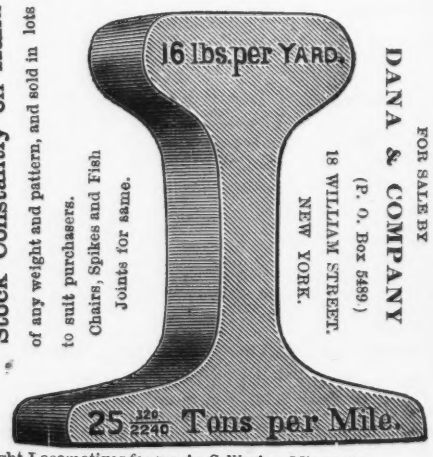

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